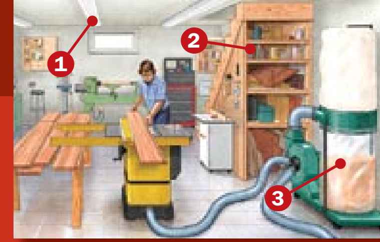
Fine WoodWorking

15 tips for basement shops, p. 56



Tools & Shops

ANNUAL ISSUE



Best-ever outfeed table

New cabinet saws are much safer

Innovative workbench is easy to make

6-in. sanders offer speed and finesse

4 bench jigs for handplanes

Versatile workstation is big on storage, p. 36

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Fine WoodWorking





Tools & Shops

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features

Cover photo: John Tetreault



68 JIGS FOR HANDPLANES

RIVING KNIVES 48





62 6-IN. SANDERS

up front

in the back

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VIDEOS

Why a Riving Knife Matters

Dramatic footage with contributing editor Roland Johnson ("Who's Got the Best Riving Knife?") shows how a riving knife can virtually eliminate potentially lethal kickback on a tablesaw.



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Our new online gallery is a community where you can easily share photos of your work and get design ideas and comments from fellow woodworkers.

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VIDEO PROJECT

Build a Small Frame-and-Panel Cabinet

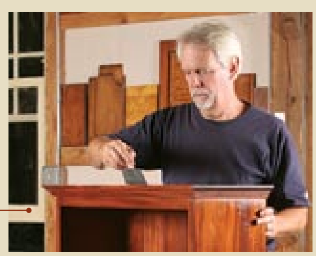
Only on FineWoodworking.com: Watch Tim Rousseau, an instructor at the Center for Furniture Craftsmanship, build a small cabinet that would work well as a nightstand or side table. You'll learn how to construct a drawer, how to hang a frame-and-panel door, and how to create tapered legs and other design refinements. See every stage from start to finish and download a project plan.



VIDEO

Cope-and-Stick Basics

Online contributing editor Andy Rae shows you how to make a strong and easy cope-and-stick door, from router-bit setup through assembly and glue-up.



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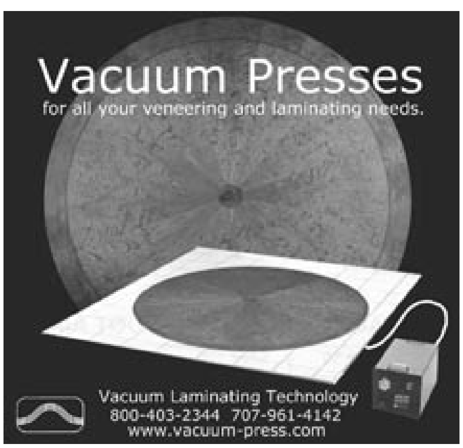


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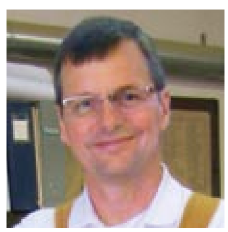
contributors



Like many woodworkers, **Joshua Finn** (*"Forget What You Know About Workbenches"*) grew up watching his father working at his bench. But it wasn't until later, at the end of a long sojourn in Europe, that the young man took a serious interest in woodworking. An impromptu woodworking job kept Finn in Wales for an extra few months and solidified his interest in the craft. Back in the United States, he began a series of apprenticeships over 12 years that took him from Brooklyn, N.Y., back to Wales, and then to Vermont and Seattle. For the last 12 years, Finn has had his own shop in High Falls, N.Y., where he lives with his family.



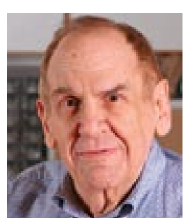
On the subject of furniture design, **Norman Pirollo** *("4 Bench Jigs for Handplanes")* is an open book ... well, blog. Keen to share his insights, Pirollo has a weblog at www.refinededge.com, featuring projects from drawers to antique-car dashboards. This hand-tool enthusiast, who specializes in boxes (www.fineboxes.com) and studio furniture, owns a woodworking business near Ottawa, Canada.



Tim DeKorte *("Brighten Your Shop With an Epoxy Floor")* was introduced to woodworking nearly 40 years ago by his brother-in-law, C.E. Beacham III, a well-known clockmaker. DeKorte, who calls woodworking "the perfect pastime," lives with his wife on the central coast of California, where he is a sales representative for an industrial paint and coatings company.



After **John Nesset** *(Shop Design)* began woodworking in 1978, he used an apartment bedroom and a four-season porch as shops. Today, he shares a communal workshop in Minneapolis. His bench, "I Am Nature," was featured on the back cover of *FWW* #155. He's at work on a commission for a large dining table, but he still works part time as a meat cutter to subsidize his woodworking habit.



You never know where you'll find **Art Liebeskind** *("Stop Suffering for Your Craft")*. He travels the world for his logistics consulting business and has been known to go cage-diving with great white sharks. If he's home, he'll be in his Baltimore woodshop, pursuing a craft he's enjoyed for 45 years. His work has helped furnish several homes, including one he built for himself on a barge in Baltimore's Inner Harbor in the 1960s.

For more information on our contributors, go to FineWoodworking.com/authors.

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letters

Spotlight

ISSUE NO. 201
November/December 2008
p. 36



STRUGGLING WITH A SKILL? THE DOCTOR IS IN

I found "A Trip to the Dovetail Doctor" to be really helpful. It filled in the gaps ... so to speak. I'll bet mistakes and bad habits are common among self-taught woodworkers, and I wouldn't mind seeing that type of article as a regular feature. By the way, if you need a struggling rookie on, well, any subject, I'm your guy!

—SCOTT BADGER, Jackson, N.H.

Editor replies: You're not alone, Scott. We've had a lot of positive feedback on that article, and on the video of that troubleshooting session. As you suggest, we are planning to repeat the formula, sending other frustrated readers to our favorite teachers (and teachers to readers in some cases) for similar one-on-one clinics, while we record the action and highlight the discoveries.

So listen up, desperados: Like the producers of TV reality shows, we're inviting you to send in your audition tapes. Whether you can't get your handplane or bandsaw to work right, or have trouble milling lumber straight or dialing in a furniture design, let us know. We'll choose a few guinea pigs and line them up with a tailor-made tutorial. This should be fun.

Send a letter, email, or short video that explains which skill or technique you are struggling with and where things seem to be going wrong. Include photos if they help to illustrate the problem.

—Asa Christiana



Tell us all about it

Direct your teary-eyed entreaties to: *Fine Woodworking*, Doctor Is In, 63 S. Main St., Newtown, CT 06470, or email fwdoctor@taunton.com.

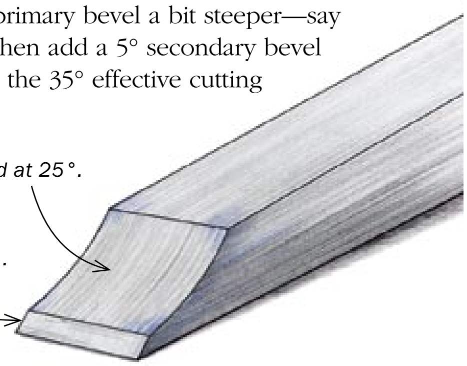
How to sharpen mortise chisels

The articles in *FWW* #198 ("Grind Perfect Edges Without Burning") and #199 ("Cut Your Honing Time in Half") were perfect companion pieces. However, thick mortise chisels pose a problem. A hollow grind with a 3-in. radius (6-in.-dia. wheel) on such a long bevel creates a shockingly deep hollow and a perilously thin edge on a tool that needs a chunky profile to withstand pounding and prying. Do the authors have any suggestions?

—STEVE SAWYER, Livonia, Mich.

Joel Moskowitz replies: On regular mortise chisels, grind the primary bevel at 22° to 25°; the hollow will make it a little shallower. This will give you the penetration angle you need. Then grind and hone a tiny secondary bevel at 35° to add the necessary toughness. You can also just hone the secondary bevel without grinding it.

On thinner sash mortise chisels, I would make the primary bevel a bit steeper—say 30°—and then add a 5° secondary bevel to arrive at the 35° effective cutting edge.



Hendrik Varju replies: I agree with Joel, and I would add that the smaller the grinding wheel, the more severe the hollowing, especially on a thick tool. So switching from a 6-in. wheel to an 8-in. or even a 10-in. wheel will help a lot.

Tip on zero-clearance inserts

When I make zero-clearance inserts for tablesaws, I do one thing differently from Tom Begnal ("Get Safer, Cleaner Cuts on Your Tablesaw," *FWW* #200). When making the final cut through the blank insert, instead of holding it down with a

About your safety

Working wood is inherently dangerous. Using hand or power tools improperly or ignoring standard safety practices can lead to permanent injury or even death. Don't perform operations you learn about here (or elsewhere) until you're certain they are safe for you. If something about an operation doesn't feel right, find another way. We want you to enjoy the craft, so please keep safety foremost in your mind.

Drawing: Kelly J. Dunton



READER SERVICE NO. 104

push stick as he does, I slide the rip fence over the insert, staying clear of the line of cut. The fence holds down the insert safely and securely as I raise the blade.

—JIM BARRETT, West Springfield, Mass.

Rule joints need clearance

I was interested in Michael Zuba's article on using a router to cut rule joints ("The Rule Joint Done Right," *FWW* #200), not least because I wrote on the same subject 28 years ago (*FWW* #80). I agree with Zuba on just about every point, but I would add a footnote on hinge placement.

Over the years, even the most well-cured wood can develop a wiggle. If the rule joint is laid out as Zuba suggests, with little or no clearance, it can begin to bind as the leaf is raised and lowered. This can produce a squawk worthy of a haunted house, stiffness in the action, and, after a while, rub-throughs in the finish. My suggestion is to follow Zuba's layout precisely, then move the hinge toward the leaf slightly. For most woods and climates, moving the hinge 1⁄16 in. will produce plenty of space between the thin edge of the leaf and the tabletop when the leaf is lowered, but will retain the snug fit when it is raised.

—MAC CAMPBELL, Lake George, N.B., Canada

YOUR TAKE

Which phrase best describes your shop space?

29%	Attached garage
26%	Basement
21%	Separate building
16%	Detached garage
2%	A room in my house
2%	Shared or rented shop
2%	Other
2%	None

In our eLetter, we poll readers on new questions each month. Sign up for the free newsletter at FineWoodworking.com.

Collect dust at its source

Although I agree with the headline, "Protect Yourself From Wood Dust" (*FWW* #201), the subtitle is incorrect: "Masks and respirators are the best defense against harmful dust." It is a well-known industrial-hygiene principle that the best defense is to collect the dust as close to its source as possible. Masks and respirators are actually the last line of defense.

—PAUL KRAMER, M.D., Evansville, Ind.

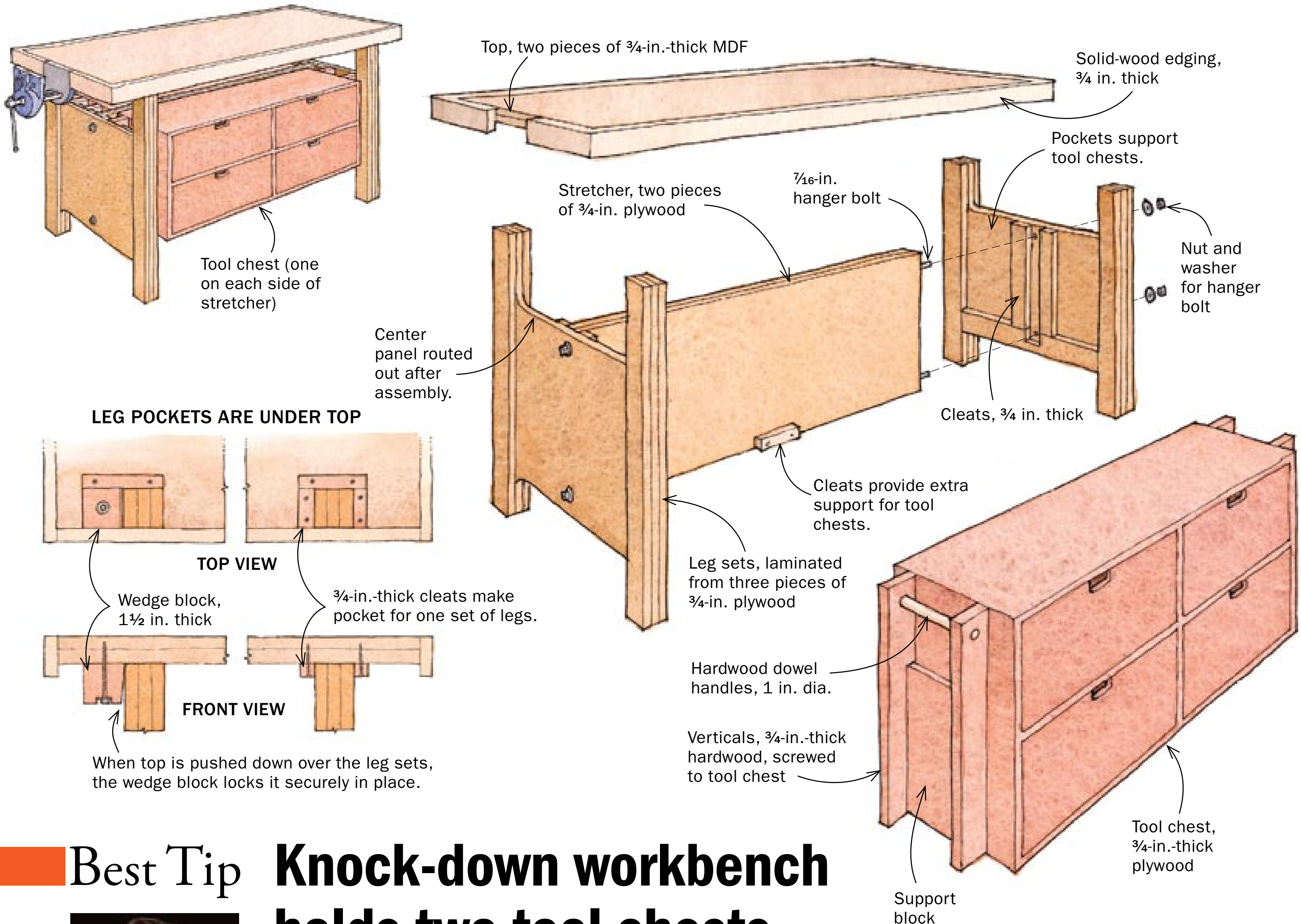
Editor replies: Don't blame the author on this one. Editors attach headlines to articles, and as you point out, we goofed. You are absolutely correct. That's why an effective dust-collection system is so important.



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EDITED AND DRAWN BY JIM RICHEY



Best Tip

Knock-down workbench holds two tool chests



John Caverly was bitten by the woodworking bug almost 55 years ago, when he took a shop class in school. Now retired, he spends a good deal of his time building furniture and tools at his home in sunny Florida.

For many years, my woodworking shop was located in an unheated garage in Michigan. This arrangement worked fine until winter cold forced me to move my entire shop inside the house. To make the annual move easier, I built this knock-down workbench.

The bench consists of six parts: two tool chests (with drawers and built-in carrying handles), two leg sets, a stretcher that connects the legs, and the top. Inside the leg sets are pockets for the stretcher and the two tool chests. The underside of the top has pockets that fit the legs on one end and wedge blocks on the other end. When the top is pushed down, the wedge blocks lock it in place.

To break down the bench, just remove the top, slide the tool chests up and out of their pockets, then loosen the bolts that attach the stretcher to the legs. It's all done in minutes. The bench is quite efficient and sturdy. I use it to store my large collection of hand tools—all 650 lb. of them.

—JOHN CAVERLY, Boca Raton, Fla.

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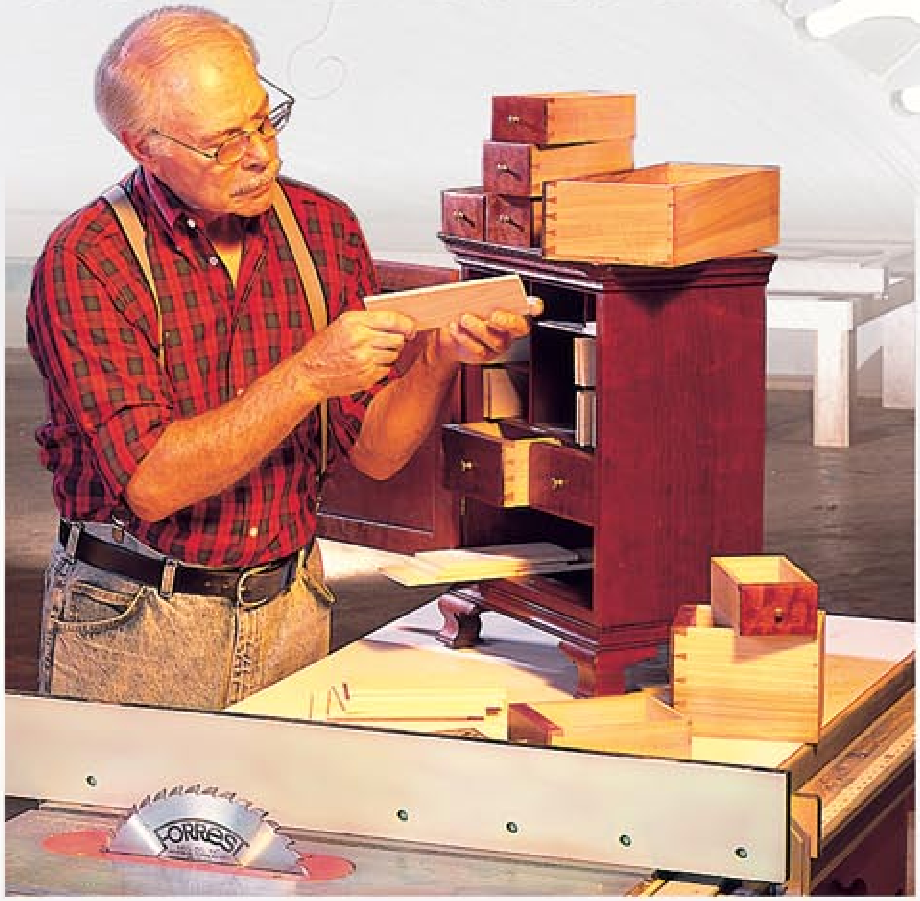
Forrest saw blades are simply the best that money can buy. They're made in the USA by the same family-owned business that's been producing and sharpening them for over 55 years. And they're backed by a 30-day money back guarantee. It's no wonder that serious woodworkers give them such high praise!

> *"Your blades are without question the best by miles, and I have tried them all."*
> Bob Jensen–Fridley, MN

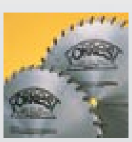
> *"These are the finest blades I have ever owned and you should be proud of your quality product."*
> Patrick T. Hankard–South Windsor, CT

> *"[Forrest blades] cut true, with no vibration. I was a carpenter by trade for over 60 years and continue to be an active wood-worker. So, I can say with confidence that Forrest blades are the best."*
> Carl Stude–Burbank, CA

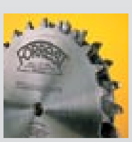
The message is clear. If you're looking for quality, performance, and value, it pays to choose Forrest blades every time.



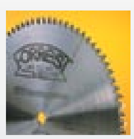
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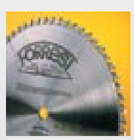
Woodworker II – This award-winning, all purpose blade is the finest of its type. It turns big jobs into easy-to-handle ones.



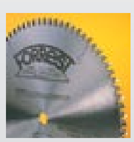
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* As seen in *Fine Woodworking*, 2004 Tool Guide, pg.121.

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Fine Woodworking*	Wood Magazine	Woodshop News	Woodshop News	Wood Magazine	Woodshop News	Woodshop News	Woodshop News
BEST OVERALL	TOP TOOL	2007	2007	TOP TOOL	2007	2007	2007

READER SERVICE NO. 13

Magnetic spring keeps benchdogs in place

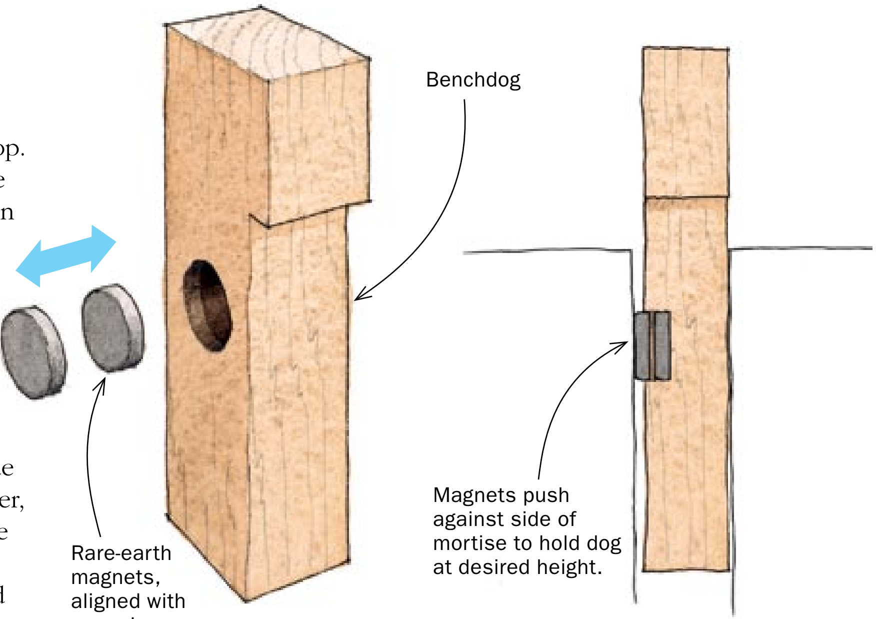
Benchdogs are shop helpers that sit in holes in a workbench top. The dogs are raised above the benchtop so that a board can be secured against them for handplaning, for instance. When not in use, the dogs slide down below the benchtop.

Most dogs are held at the correct height with a metal or wood spring built into the sides. When I was making a bunch of dogs for a recently completed workbench, I realized that it takes a lot of fussing to fit each dog with a wooden spring. I wanted a quicker and easier way to hold the dog at the desired height.

My solution was to inset two rare-earth magnets into the side of each rectangular dog. I arranged the pair to repel each other, which causes the outer magnet to press against the side of the dog hole, holding the dog at the height you want.

Don't pull the dog out too far, though, or the magnets could pop out. It helps to locate the magnets as low as possible, so you can maximize the height of the dog.

—JIM SHAPIRO, San Francisco



Quick Tip

To prevent work from slipping, I used to glue sandpaper to the face of my miter gauge and to other jigs and fixtures. Now I use skateboard grip tape instead. It is tough, long lasting, and comes with a self-adhesive backing. You can find this abrasive tape at any skateboard shop or online at www.tactics.com. Jessup and Shorty's Black Magic (under $5 for a 33-in. roll) are two good brands.

—JOHN A. HASSE, Fort Collins, Colo.

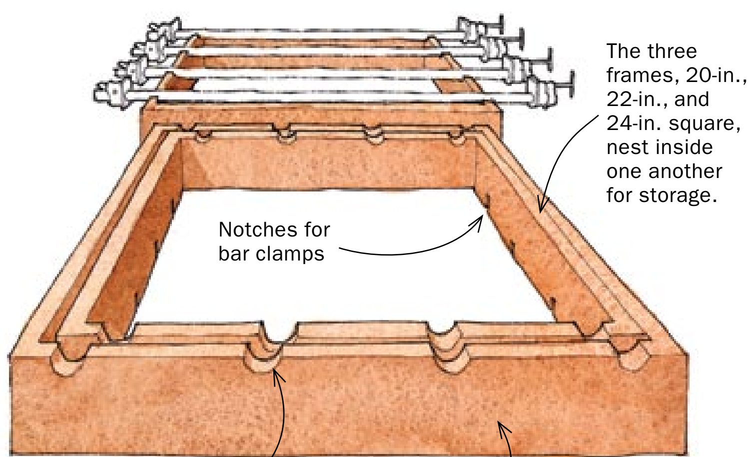
Nesting frames help with glue-ups and more

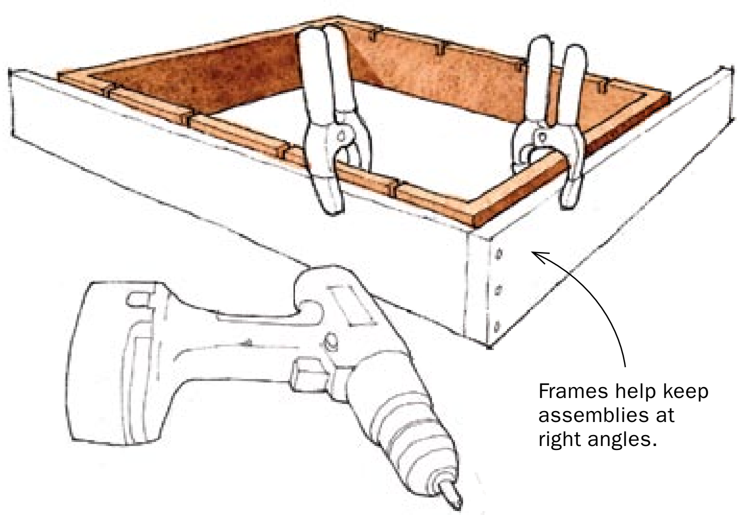
These nesting square frames, which I call multitask shop helpers, take up very little space but pack several functions into a small package.

The frames are great for both panel and carcase glue-ups. They are notched to hold bar clamps on one side and pipe clamps on the other, which makes them handy for panel assemblies. And the frames can be used to help keep a carcase, a box, or a drawer square during assembly.

The frames are handy for cutting stock, too. I use two of them to elevate a board above my bench for crosscutting. In addition, each frame is the same height as my miter-saw bed, so they can be used as outfeed support there.

—SERGE DUCLOS, Delson, Que., Canada









READER SERVICE NO. 84



READER SERVICE NO. 31

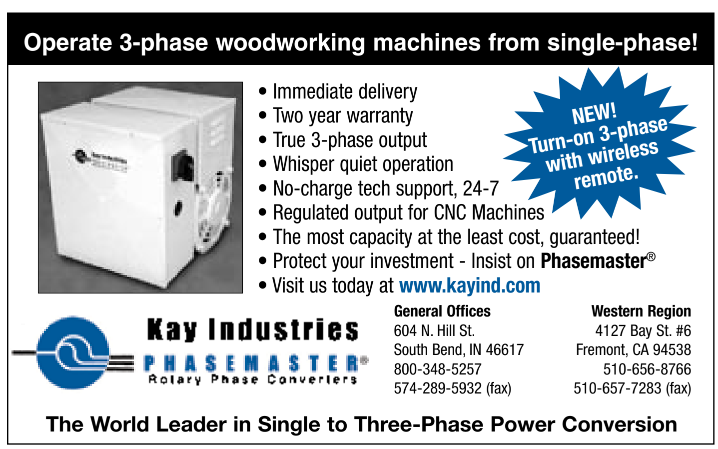


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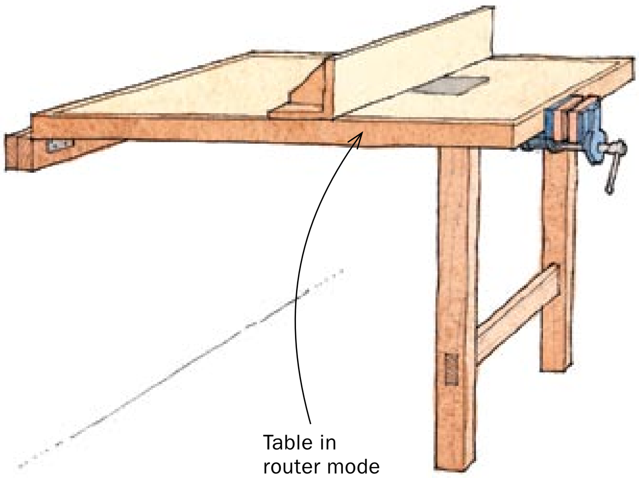


READER SERVICE NO. 43



READER SERVICE NO. 86

Space-saving work table folds flat against wall



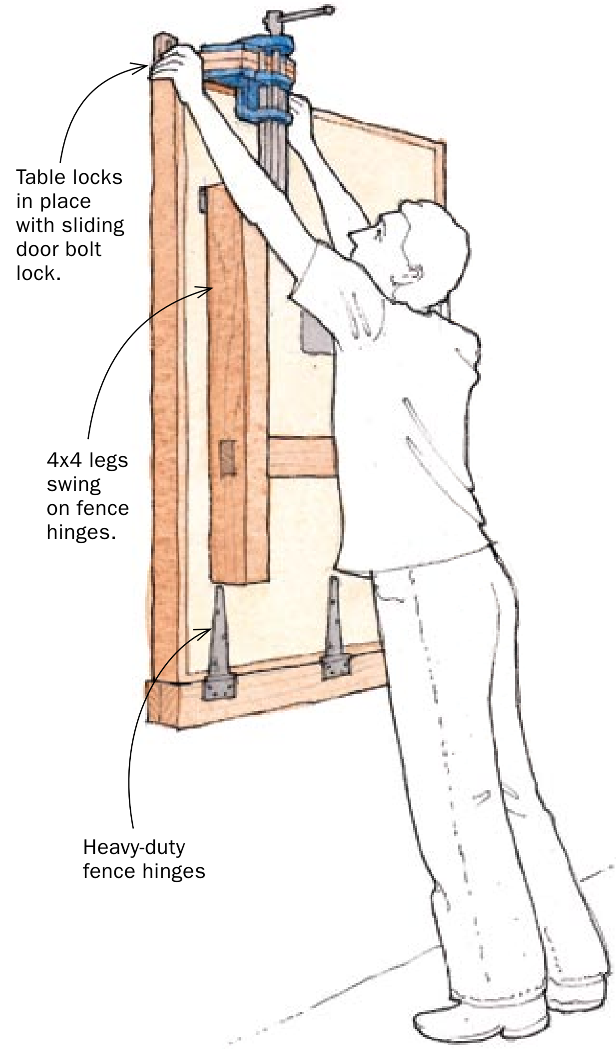
My shop is a one-car garage where woodworking has to coexist with motorcycling, bicycling, and other family interests. I needed a shop worktable that could double as a router table and disappear when not in use.

The design shown is made of three glued layers of ¾-in.-thick plywood with a plastic-laminate top and a solid-wood edge. I installed a router-support plate in the middle of the table and a woodworking vise along the front edge.

The table is attached to the wall via a cleat with three heavy-duty fence hinges. The legs pivot and unfold on the same type of hinges. Folded up, the table is held in place with a sliding door lock that fits a hole in the front apron.

To protect the laminate surface while I'm using it as a work table, I cover it with a sheet of ¼-in.-thick high-density fiberboard.

—DANIEL DUCEPPE, Sherbrooke, Que., Canada



Quick Tip

I have replaced the paper-towel dispenser at my workstation with a napkin holder, the kind diners use to dispense napkins one at a time. This approach is more economical than paper towels when wiping up glue and spills. The napkins dispense easily, even if you're wearing rubber gloves, and the holder takes up less space and can be brought to the work spot or mounted on a wall. You'll find them at restaurant-supply houses.

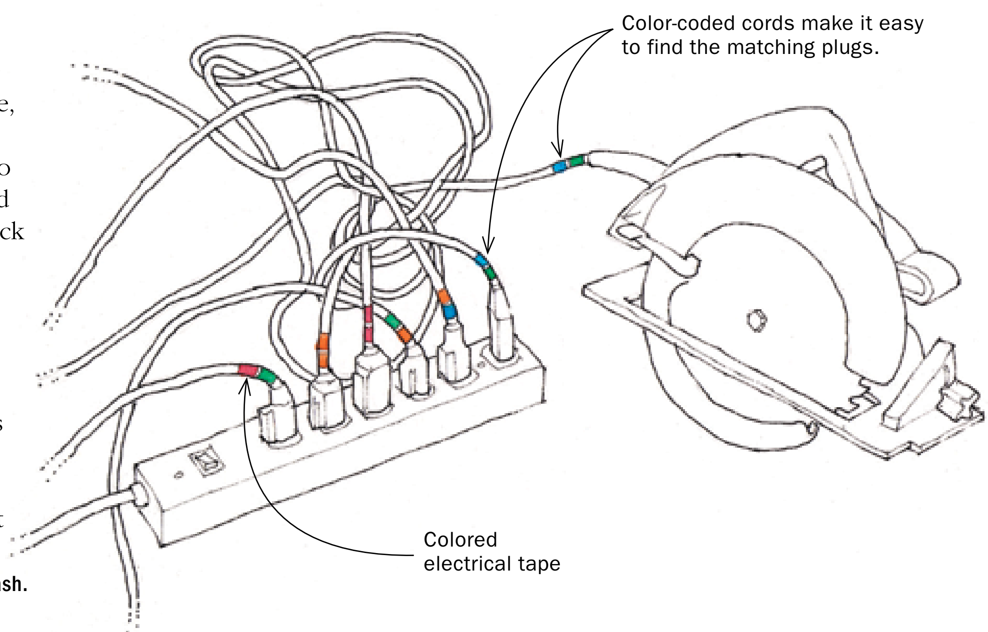
—JOE ESPOSITO, Foster, R.I.

Color-code your power-tool cords

I plug many of my tools into a six-outlet power strip in the center of my shop. At any given time, I have several tools plugged in with the cords invariably tangled. In the past, when I needed to unplug a tool to plug in something else, I would trace the cord through the tangle all the way back to the tool—a hassle, to say the least.

I eliminated this problem by buying a package of five different colors of electrical tape. For each tool, I wrapped a color, or combination of colors, near the plug and wrapped the same color where the cord enters the machine. Now, if I want to unplug a tool, I check its color code on the tool, and then unplug the matching cord at the power strip. It is much quicker and safer.

—JIM BUCKNELL, Bow, Wash.





READER SERVICE NO. 6



READER SERVICE NO. 83



READER SERVICE NO. 61



READER SERVICE NO. 12

tools & materials

MACHINES

Mini-lathe has extra capacity and power

I RECENTLY TESTED A NEW MINI-LATHE from Jet, the model 1220VS. It features a ¾-hp variable-speed motor (270 rpm to 4,200 rpm), a 1-in. by 8-threads-per-inch (tpi) spindle, and No. 2 Morse-taper centers. It also has a 12-in. swing over the bed (9½ in. over the tool rest) and a 20-in. capacity between centers. A sister mini-lathe, model 1220, has a six-speed (500 rpm to 3,900 rpm) motor.



Mini in name only. *Jet's new mini-lathe weighs 125 lb., making it more of a midi-lathe.*

A 24-position index pin doubles as a spindle lock, a real time-saver when removing faceplates and chucks. Jet has also included a plastic tool caddy, a flexible work lamp, and both a 6-in. and a 10-in. tool rest.

Other standard equipment includes a faceplate, a spur center, a knock-out bar, and a live center. All that good stuff adds weight; the 1220VS is about 125 lb., so it won't be portable for everyone without help.

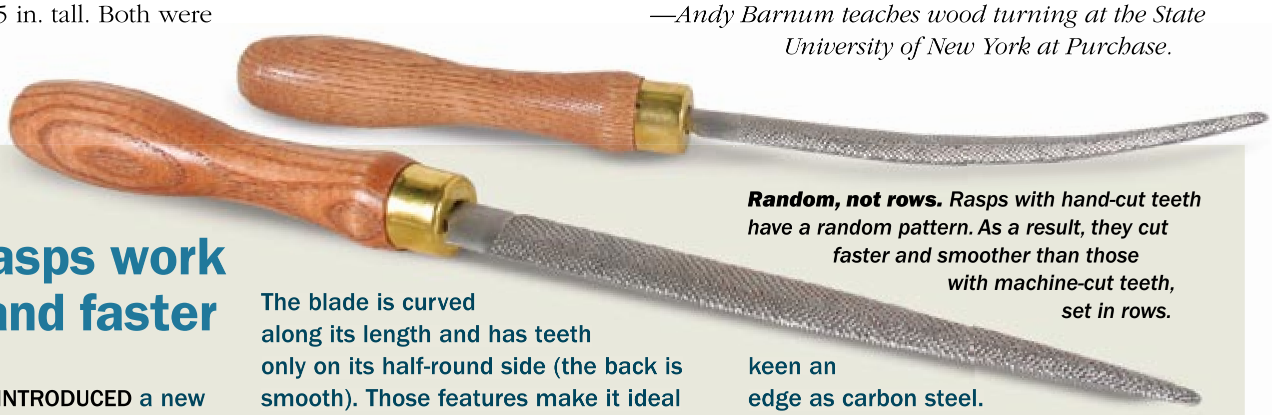
Options include a bed extension that increases the capacity between centers to 48 in. and a steel stand that adjusts from 43 in. to 45 in. tall. Both were sturdy and well-made.


Accessories add capacity. *An optional bed extension allows longer turnings, while a sturdy stand is height-adjustable.*

Once fired up, the 1220VS was a pleasure to use. I turned spindles and bowls with very good results. It ran quiet and smooth, with no noticeable vibration. And it had plenty of power throughout the entire speed range, with no drop-off in torque at the lower speeds.

The 1220VS sells for around $550; the 1220 for about $445. For more information, check out www.jettools.com.

—Andy Barnum teaches wood turning at the State University of New York at Purchase.


Random, not rows. *Rasps with hand-cut teeth have a random pattern. As a result, they cut faster and smoother than those with machine-cut teeth, set in rows.*

HAND TOOLS

Hand-cut rasps work smoother and faster

GRAMERCY TOOLS HAS INTRODUCED a new line of hand-cut rasps. Unlike the evenly spaced teeth on machine-cut rasps, the barbs on hand-cut rasps are randomly spaced. When it comes to rasps, randomly spaced teeth cut smoother and faster.

Gramercy offers seven cabinetmaker's rasps and a handle-maker's rasp. The handle-maker's rasp (top right) is unique: The blade is curved along its length and has teeth only on its half-round side (the back is smooth). Those features make it ideal for sculpting the inside edges of closed pistol-grip tool handles.

All the rasps have nicely shaped ash handles. The blades are surgical-grade stainless steel, so they are tough (the teeth won't break), long-wearing (the teeth stay sharp), and won't rust. Stainless steel doesn't take quite as keen an edge as carbon steel. Even so, I was more than satisfied with the performance of the rasps.

The cabinetmaker's rasps range in price from $54 to $110; the handle-maker's rasp is $50. More information can be had at www.toolsforworkingwood.com.

—Chris Gochnour builds custom furniture and teaches woodworking in Murray, Utah.

Photos: staff

DRILLING

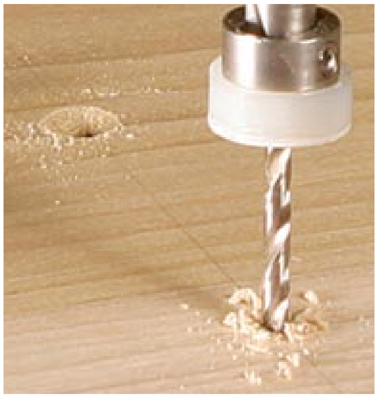
Improved countersink bits



Set of four. *The bits come in four sizes, so you can drill holes for the common screw sizes of #6, #8, #10, and #12.*

COUNTERSINK BITS ARE GREAT TIME-SAVERS because they drill a pilot hole and countersink (or counterbore if needed) in one step. These bits typically include depth stops, too.

On the downside, they tend to clog quickly. If you don't stop regularly to clear the chips, you can burn the wood and overheat the bit. Also, since most depth stops spin with the bit, they can create a disk-shaped burn on the wood.



No more burn marks. *The depth stop stops spinning when it contacts the workpiece, so it won't leave a burn mark in the wood.*

Woodworker's Supply has worked to solve those problems with its new CleanStop Countersink Bits. Large flutes on the countersink cutter help keep clogging to a minimum. The depth stops have a couple of channels to allow chips to exit freely. At the same time, the depth stop acts like a bearing, allowing the bit to spin while the stop stays fixed in place, so there's no burning.

After giving the bits a workout, I concluded they have excellent chip-clearing capability. I was able to drill deep holes without having to withdraw the bit to clear heavy clogs. Every hole was drilled cleanly in one shot, and the non-marring stop collars didn't char the workpiece surface. A four-piece set sells for $60. Bits also are available individually. Go to www.woodworker.com.

—Mario Rodriguez teaches at the Philadelphia Furniture Workshop.

FINISHES

Fresh shellac on the cheap



Fast dissolving, lower cost. *Shellacfinishes shellac flakes dissolved and dried as fast or faster than other quality flakes, and cost less, too.*

GROWING NUMBERS OF WOODWORKERS have discovered the benefits of shellac. It seals in almost anything and, when dewaxed, is compatible with almost any subsequent finish. But shellac must be fresh, or it won't dry properly. So a lot of finishers make their own, dissolving shellac flakes in denatured alcohol. One drawback: You must remember to dissolve the flakes a day or two before you use them.

A new company called Shellacfinishes claims to have solved the dissolve-time issue. It imports shellac flakes directly from India and says that its flakes are fresher than those offered elsewhere. Fresher flakes, they say, dissolve faster, and the finish dries faster.

In an informal test, we compared the dissolve time for garnet shellac flakes from Shellacfinishes with the J.E. Moser brand sold by Woodworker's Supply and Jeff Jewitt's Homestead Finishing brand. We began at midday, and despite swirling each jar about once an hour, none of the samples had completely dissolved by 10 p.m., although the Homestead and the Shellacfinishes samples were close. Both dried hard equally fast when a drop was put on some glass, another sign of freshness.

Shellacfinishes sells five types of dewaxed shellac, plus a four-type sampler pack. Prices range from $12 to $21 per pound, lower than most other online sources (www.shellacfinishes.biz).

—Mark Schofield is the managing editor.



Much less tearout. *A recently introduced jigsaw blade from Bosch made clean cuts in a variety of materials.*



■ BLADES

New jigsaw blades are smooth cutters

BOSCH IS NOW OFFERING A JIGSAW BLADE with some features that make it an especially smooth cutter.

Traditional jigsaw blades cut only on the upstroke, so the top surface of the workpiece is more prone to chipout. This new blade from Bosch—the T308B Xtra-Clean for Wood—is designed to cut on both the upstroke and downstroke, and that helps to reduce chipout on both faces.

Also, unlike most jigsaw blades, which are made on a stamping machine, the T308B Xtra-Clean's teeth are ground. That makes them much sharper; all else being equal, sharp teeth cut faster and produce less chipout.

I used the Bosch blade and a typical stamped blade to make straight and curved test cuts in oak, walnut, cherry, pine, birch plywood, and melamine. The Bosch consistently produced cleaner cuts.

A package of five T308B blades sells for $14 (it's available only with a T-shaped shank). Look for the blade at Lowe's and woodworking speciality stores. For more information, go to www.boschtools.com.

—Tom Begnal is an associate editor.

■ REFERENCE

Wood samples a good reference

WONDER WHAT SUMAC LOOKS LIKE, or chinkapin, slippery elm, or hackberry? A company from Maine, called Wood Smart, can help. They sell sample boxes of 46 North American wood species commonly used to make furniture.

Each unfinished sample measures ½ in. thick by 3 in. wide by 6 in. long. As we discovered, that's enough room to test a finish or two on the back side. Each sample is labeled with the common and botanical names of the wood. Also noted is information on weight (shown as specific gravity) and shrinkage characteristics. In addition, the box includes a table that allows you to determine how much a board will expand and contract due to seasonal changes in relative humidity.

The set sells for $130 and is available from Lie-Nielsen Toolworks. For more information, go to www.lie-nielsen.com.

—T. B.



Mix and match. *This sample box makes it easy to choose a wood for a project, or combine woods gracefully.*


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Not all carbide is created equal



THE HARDEST MAN-MADE MATERIAL HAS REVOLUTIONIZED WOODWORKING, BUT QUALITY VARIES

B Y   M A R K   S C H O F I E L D

"Get used to honing your bits each time you use them, as dull ones tend to chip, splinter, and burn the work."

This advice, from the first issue of *Fine Woodworking*, is a reminder that some things have gotten a lot easier over the last 30 years.

The author was referring to steel router bits, and the reason this advice is no longer needed is summed up in one word: carbide. Invented in Germany in the 1920s, tungsten carbide is a dense, hard, wear-resistant material that now is everywhere from giant mining tools to the rolling ball of your pen. In woodworking, it has revolutionized sawblades and router bits, increasing exponentially the length of time between sharpening.

It's easy to take those carbide tips for granted, but after doing some research I've gained a new respect for them. There's a lot of technology in each tip.

Unfortunately, not all carbide is created equal, and there is no national or international standard for well over 5,000 different carbide grades. But there are ways to increase your chances of buying tools with premium-quality carbide. I also learned how to prolong the life of carbide-tipped blades and bits, and how to tell when they do need sharpening.

Carbide varies by quality and type

Tungsten carbide is the hardest man-made material known, with wear resistance about 100 times that of steel. In addition, it has 2½ times the rigidity of steel, is dimensionally stable, retains its hardness at high heat, and has an impact resistance similar to hard tool steels. In short, it is pretty amazing stuff.

You may have seen tool makers refer to their carbide as being C1, C2, etc. These grades, originally developed for classifying carbide by its ability to cut metal (they run from C1 to C19), are defined not by its chemical makeup, which can vary widely,

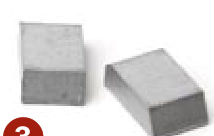
From fine powder to power tools



1



2



3

CARBIDE IS MADE IN THREE STAGES

Carbide begins as a mixture of very finely ground tungsten and carbon black (1). After a binder such as cobalt and some wax are added, the material is molded into its rough shape and given an initial baking. Known as green carbide, the material at this intermediate stage is soft and crumbly (2), which allows it to be machined easily. Finally, it is baked a second time at high temperature, which causes the material to shrink 18% to 24% to create the hard, dense carbide used on tools (3).

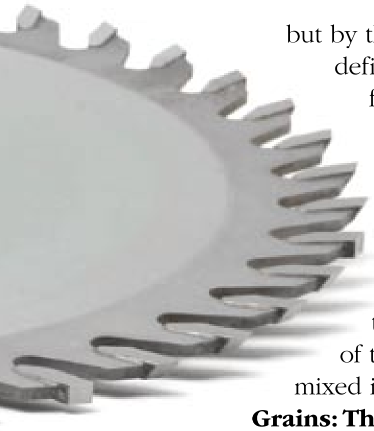


Molded under pressure. *Metal-injection molding (MIM) is used to form the powder/binder/wax mixture into more complex shapes. The equipment is similar to that used for injection molding of plastics.*



Attached as teeth. *Carbide tips are brazed onto the steel plate of a sawblade. Repairs to broken teeth are done in the same way.*

Photos: Multi-Metals (this page, bottom center); Case Western Reserve University (microscope images)



but by the style of work it can do. C3 is defined as finishing, C4 as precision, for example, but there is no agreement on what this means.

Like steel makers, carbide manufacturers face a trade-off between toughness (the ability to resist fracture), and hardness (wear resistance). There are two main ways to vary the properties of carbide: the size of the grain and the percentage of binder mixed in.

Grains: The trend is smaller—You'll often see carbide tools listed as having submicron carbide or micrograin carbide. This means the individual grains of carbide are less than 1 micron in diameter. Fine-grained carbide is listed as being 1–2 microns, medium as 2–5 microns, and coarse as over 5 microns. With the exception of fine-grained carbide found on "construction-grade" tools such as circular-saw blades or cheap router bits, most woodworking carbide is submicron because it gives greater wear resistance. Unfortunately, this also decreases the toughness of the carbide. To try and reach the sweet spot of greater longevity without excessive chipping or cracking, some manufacturers change the composition of their carbide by adding boron or titanium carbide.

Binder: the trade-off—The percentage of cobalt binder for most woodworking products ranges from 3% to 10%. As you increase the percentage, the hardness goes down, decreasing wear resistance, but strength goes up for better fracture resistance. Manufacturers use this to adjust the carbide's properties for different uses. Freud, alone among the woodworking tool makers, manufactures all of its own carbide and makes 22 grades. It might use an ultrafine grain (less than 0.5 micron), high-cobalt carbide for the exposed sawteeth on a high top-bevel blade,

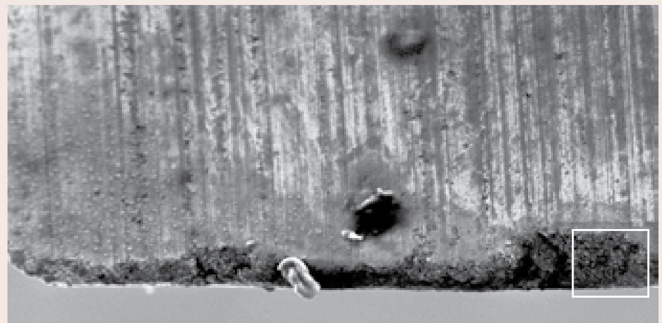


Used in solid form. *While some bits and blades have carbide pieces attached to a steel plate or shaft, others, such as this spiral cutter, must be machined from solid carbide.*



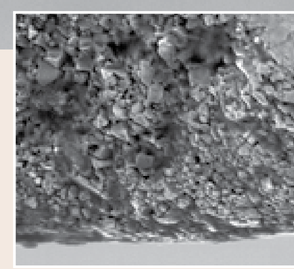
Tale of 2 bits: hard vs. tough

We were curious to see and compare the wear on two router bits tested in *FWW* #191 ("Tool Test: Router Bits"). David Matthiesen, a professor in the Department of Materials Science and Engineering at Case Western Reserve University, placed the winning and losing bits in a scanning electron microscope and looked at the damage to the straight edge on each, first at 350x resolution and then at 2,500x. We also noted the finer sharpening job on the better bit.



350x

TOP PERFORMER



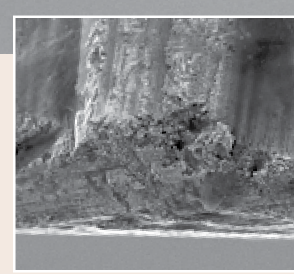
2,500x

Hard-wearing but brittle. *Some types of carbide emphasize hardness and wear-resistance, but they tend to be more brittle and can chip away. This bit was still cutting cleanly despite the microchips.*



350x

BACK OF THE PACK



2,500x

Tough but malleable. *This carbide resisted fracture better than the bit shown above but got blunt faster. The rounded-over edge made poor-quality cuts soon after the test started.*

Keep carbide clean





Brush your teeth regularly. *If pitch and residue are allowed to build up on the sawteeth, they will increase friction. This extra heat will shorten the life span of the carbide. Apply a mild household cleaner or blade-and-bit cleaner, allow it to sit for a few minutes, and then scrub the teeth with a brass- or nylon-bristle brush.*

but on a triple-chip grind blade designed to cut more abrasive melamine, more wear-resistant carbide is used.

What to look for

As one manufacturer of high-end blades ruefully explained, you can't tell good carbide from bad with the naked eye. You have to rely on the old saying "You get what you pay for." There is plenty of cheap carbide around, much of which contains recycled material, but most professional-quality tools use only virgin carbide.

What you can see with the naked eye is how finely ground the carbide is. A tooth or flute with visible coarse grind marks will be less sharp than one with a more polished appearance. A manufacturer trying to cut costs by using cheap carbide is unlikely to invest more than the bare minimum sharpening it. When comparing similar types of blades, choose the one with thicker carbide because it probably will be more durable and can be resharpened more often.

The way the teeth are brazed to the sawblade or router bit is also important. Steel's thermal expansion during brazing is two to three times that of carbide. So with conventional braze alloys, as the steel cools, it shrinks more than the carbide and wants to draw the latter into a bow shape, creating stresses.

If possible, choose a tool that claims to be made with tri-metal brazing shim using silver-copper-silver braze, as this reduces the joint stress caused by brazing. Last, go to a manufacturer's Web site and look around for information on the carbide it uses. If the site goes into detail about the carbide, there is a better chance the company is concerned about quality and matching the carbide specs to the tool's use.

How to make it last longer

High levels of pitch and residue buildup should be avoided because, as the residue is pulled away, it can take small microchips from the cutting edge with it. Eventually this will blunt the corners and cutting edges. Also, buildup increases friction and heat, shortening the life of the carbide. To overcome this problem, clean your carbide regularly.

There are many recommended dos and don'ts when it comes to cleaning sawblades and router bits. Freud recommends soaking the blade in kerosene and then removing the buildup with a bristle brush. Products the company has found that attack carbide are those very high or low on the pH scale. Forrest Manufacturing recommends cleaners such as Formula 409 or Fantastik in conjunction with a brass- or nylon-bristle brush such as an old toothbrush. Don't use a steel wire brush, as this will damage the carbide. Forrest doesn't recommend oven cleaner because it tarnishes the steel plate of the blade and removes any plastic film including the logo. Last, it is much easier to remove slight buildup on the blade or bit frequently than it is to wait until a thick layer of residue is baked on.

Materials that wear down carbide—Carbide is strong stuff, but there are one or two uses that will shorten its life. Any wood high in phenolic acid will corrode the cobalt binder. Fortunately, this is mostly found in green or wet wood, and in particular cedar—not something furniture makers are likely to encounter often.

Woods containing silica or salts, such as teak, also are more abrasive, as are man-made materials such as medium-density fiberboard and plywood. If you are going to be cutting large amounts of plywood or teak, put on an old carbide blade and save your best one for less-abrasive cuts.

When to sharpen—How can you tell when it's time to sharpen your carbide? Burnt cuts is one warning sign; increased pressure required to make the cut is another; deteriorating cut quality such as chipout when crosscutting plywood is a third.

Finally, should you sharpen your own carbide tools? In almost all cases, it is better to let a professional sharpening service do the job; after all, you no longer need to sharpen these tools each time you use them. □

Photos, except where noted: staff

Pencil and paper

WORK PRECISELY BY USING THESE SIMPLE TOOLS IN UNCONVENTIONAL WAYS

B Y H E N D R I K V A R J U



You don't need to be high-tech to achieve high precision. Whether you need to move your tablesaw fence a few thousandths of an inch or craft a perfectly fitted mortise-and-tenon joint, you can see and control nearly invisible differences by using two of the most common and ancient tools around—a pencil and paper. The next time you want to dial in a higher level of accuracy, don't reach for your credit card to buy the latest alignment gadget. Instead, pull a few business cards from your wallet and a pencil from your tool belt.



Pencil strokes highlight your progress

Whether sharpening, planing, or routing, sometimes the amount that needs to be removed is so little it's hard to see with the naked eye. Drawing pencil lines on the workpiece or the tool can make your progress easily visible.





GET A WATERSTONE TRULY FLAT

A waterstone needs to be perfectly flat to work well, but it is hard to tell when this has been achieved. To track your progress, draw light pencil strokes on the face of the stone before flattening it. (A number of abrasives can be used; pictured at right is silicon-carbide lapping grit on glass.) The marks will disappear first on the high points, so keep rubbing until all pencil strokes are gone.

Photos: Mark Schofield





AVOID TAPERING TOO FAR

A jointer or handplane is used to refine table-sawn tapers on a leg, with each pass extending the taper farther up the leg. But stray into the designated flat area, and you'll see a gap when the apron is attached to the leg. A few pencil strokes near the start of the taper highlight when to stop planing.



FIT A MORTISE AND TENON

When fitting a tenon to its mortise, it can be difficult to assess where the tenon is too thick. Pencil strokes on the tenon cheeks will rub off where the fit is too tight, showing where to pare the tenon for a proper fit.



SEE WHERE YOU'RE PLANING

If you're flattening a glued-up panel, start by finding all of the high areas using a straightedge and marking them with pencil strokes. This way you can concentrate on the areas that need the most wood removed. You'll also be able to track any places you missed. Use a different pattern of pencil strokes in the lowest spots as a warning to avoid planing these areas.



SET A ROUTER'S DEPTH PRECISELY

When bringing trim or a plug level with its surroundings, you need to set a straight bit to cut exactly level with the surface. Mark a piece of plywood with some heavy pencil strokes, then gradually lower the bit until the pencil marks get lighter but are just visible. While this might sound difficult to attain, a good microadjust system on your router will easily allow you to dial in just a couple of thousandths of an inch at a time. If you go too deep, back off, draw some more lines, and try again.

Paper shims

I constantly need to adjust a setup, fence, or workpiece by a few thousandths of an inch to achieve perfect accuracy. Paper is a great way to make precise adjustments. A non-embossed business card is typically 0.011 in. to 0.012 in. thick, standard 24-lb. printer paper is 0.005 in., and phone-directory paper 0.002 in. to 0.003 in.

PRECISION DADOES AND RABBETS

If you need to widen a dado or rabbet by a very small amount (1), moving the tablesaw fence a few thousandths of an inch isn't an easy task. Clamp a straight piece of milled stock behind the fence, but with a few business cards sandwiched between them (both at the front and back of the fence to keep it from racking) (2). After making a test cut, remove or add business cards or paper shims to move the fence one way or the other by precise amounts, and make the cut (3). The width of the dado or rabbet will be perfect (4).


1


2


3


4



BUSINESS CARDS CHANGE GRINDING ANGLES

Adjusting the tool rest to a specific angle on a grinder can be an experimental task. Now I change the angle by placing shims between the tool rest and the tool. On my 6-in. grinding wheel, I've found that adding seven business cards lowers the grinding angle by about 2.5°. I have my tool rest set at a standard 30° angle, but when I need 25° for my low-angle block plane iron, I simply install 14 business cards and tighten the clamping mechanism, and the job is done.



SET UP A HOLLOW-CHISEL MORTISER

You need a space between the chisel and its mating auger bit. Place business cards between the top of the mortising bit and its holder when inserting both auger bit and chisel. With the auger secure, release the chisel holder, remove the business cards, and raise the chisel before retightening it. Use three cards for the ½-in. chisel, two for the ⅜-in. size, and one for the ¼-in. chisel.



SNUG-FITTING LAP JOINTS

A lap joint must be cut to precisely the width of its mating part. Set a stop block on the auxiliary miter gauge so that the cut will end up fractionally wide, but then place a number of paper or business-card shims in front of the block so that the cut will be too narrow. Remove the shims one at a time until the cut matches the desired width.



FLUSH JOINTS START WITH SHIMS

Where the face of one board must end up flush with the end grain of another, place a couple of business cards under the face-grain board when cutting the joint either with biscuits or dowels. This will guarantee that the end grain ends up fractionally proud. Now flush the joint using a low-angle block plane.



Best-Ever Outfeed Table

Versatile workstation stores all your tablesaw gear and then some

BY JOHN WHITE

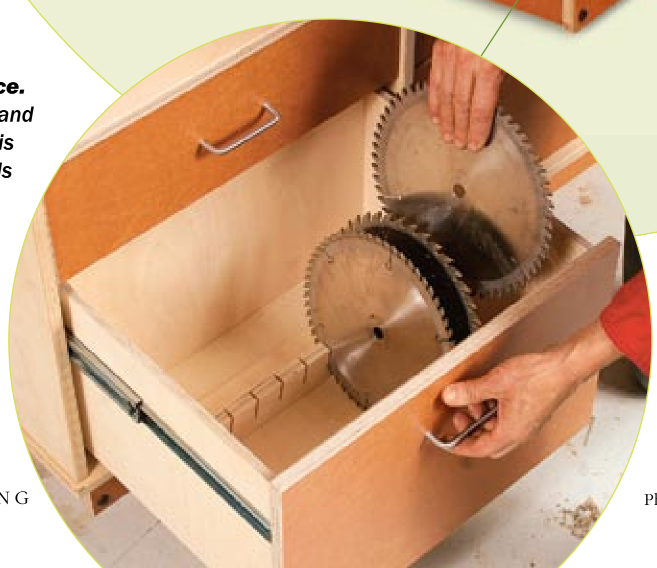




Shelve your sled. *A dedicated shelf keeps the crosscut sled out of the way but easily accessible.*



No wasted space. *You can do glue-ups and other bench tasks on this table, so you'll need tools and supplies nearby.*



Blades at the ready. *The bottom drawers are deep enough to store blades vertically, making them easier to identify and pull out.*



Stow your fence. *A well-placed rack keeps the rip fence close at hand.*

Photos, except where noted: Matt Kenney; this page: John Tetreault

A good outfeed table is essential for safe woodworking, because it allows you to control the workpiece as it moves past the blade and off the back of the tablesaw.

Without it, you'll have to push down hard on the back of long boards, which makes it difficult to guide them safely past the blade. An outfeed table also naturally doubles as a work surface for assembly and finishing. But the space beneath the table often lies unused, a wasted opportunity for efficient storage.

This outfeed table has a cabinet below that takes advantage of that space, with dedicated storage areas for the rip fence, miter gauge, crosscut sled, blades, and several big drawers for jigs. And there's plenty of shelf space for general storage, as well as room on the end panels for clamps. The large phenolic-plywood top is great because it's so slick that materials almost float across it. And because the surface resists stains and glue, it's perfect for assembly and finishing. I let the top overhang the base for easier clamping.

It's easy to adjust the table's height and level it, too. So if you move to a new shop, you won't need a new table.

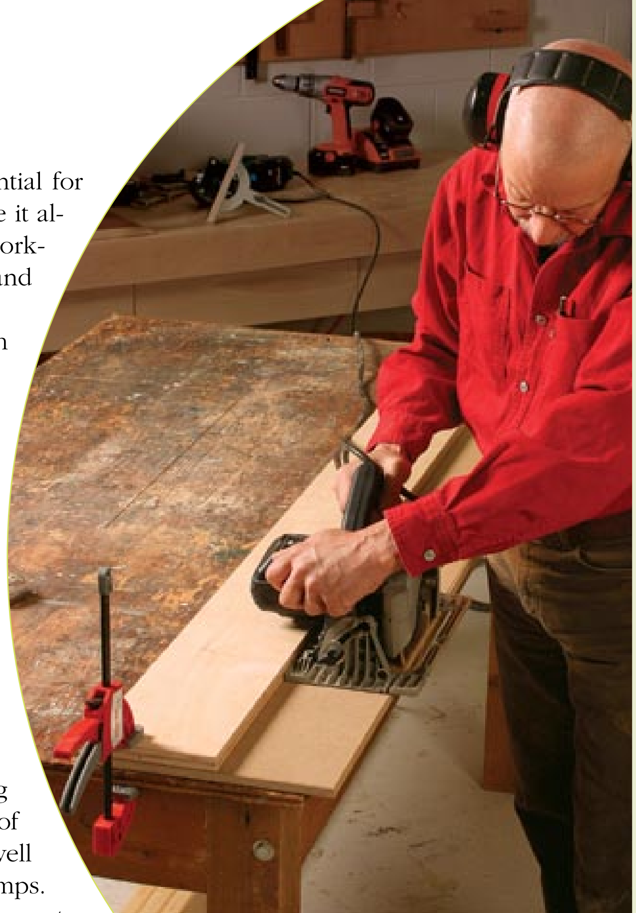
Best of all, this outfeed table is not difficult to build. The hardest part may be dealing with the large sheets of plywood, but I'll offer tips that make breaking down and squaring the material easier. All of the joinery is simple. The cabinet itself is joined by butt joints held together by screws (I'll offer pointers on assembling the joints accurately). The drawers are joined by a rabbet-and-groove joint that requires only two tablesaw setups.



Materials improve function and ease construction

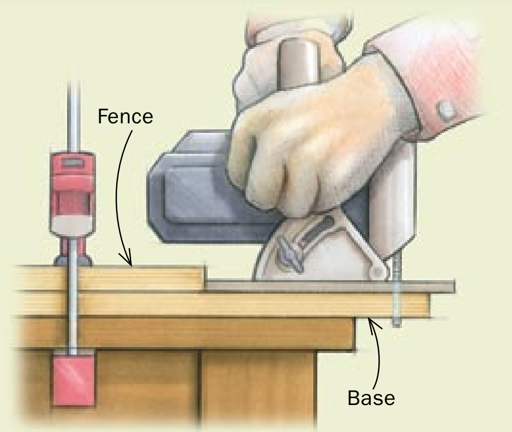
This cabinet is built entirely of sheet goods, except for two Douglas-fir runners. The top, drawer fronts, and kick plates come from a single 4x8 sheet of phenolic plywood. The cabinet is ¾-in.-thick Baltic-birch plywood and the drawers are ½-in.-thick Baltic-birch plywood.

The entire table can be made more economically from medium-density fiberboard (MDF) or ordinary plywood, but you'll have to use connecting bolts with barrel nuts to make strong joints in the softer MDF. With plywood, you can use screws. And you'll need to apply a finish to the

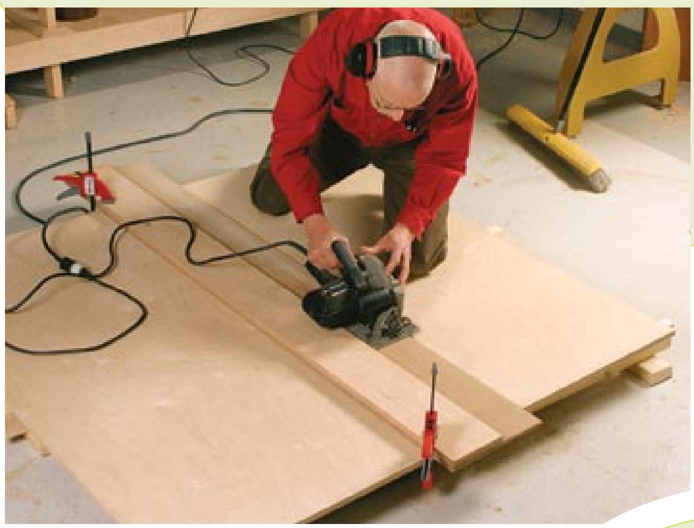


PRECISE PLYWOOD PIECES

Use a circular saw and guide to square up factory-cut edges and to cut parts to a manageable size for the tablesaw.



Make a cutting guide. *Attach a fence to a slightly oversize base. Then trim the guide with a circular saw to establish a dead-accurate reference for lining up cuts.*



How to use it. *Align the guide so that the first cut not only gives you a straight side, but also a square corner.*

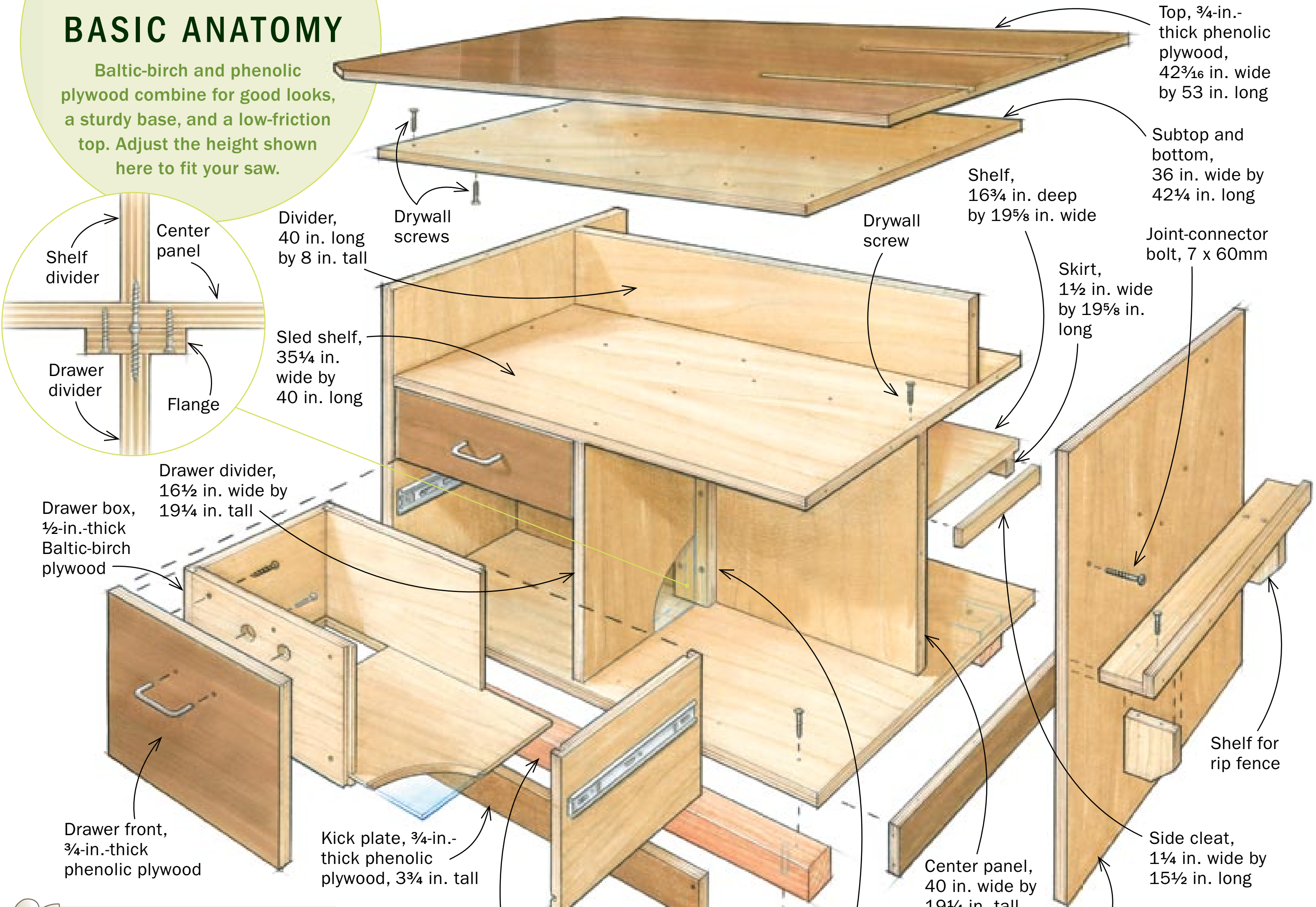


TIP

Bar-clamp handle. *When trimming the panel square, use a bar clamp to help hold it against the fence. A block at either end helps keep the clamp in position.*

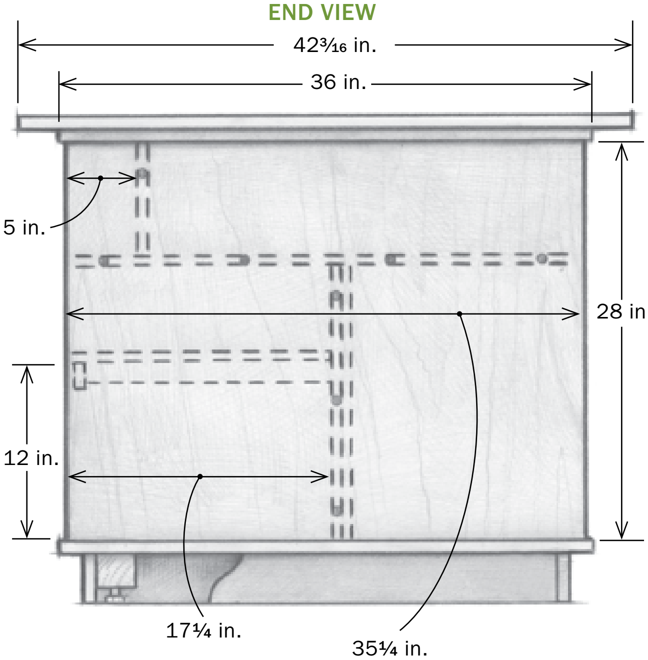
BASIC ANATOMY

Baltic-birch and phenolic plywood combine for good looks, a sturdy base, and a low-friction top. Adjust the height shown here to fit your saw.

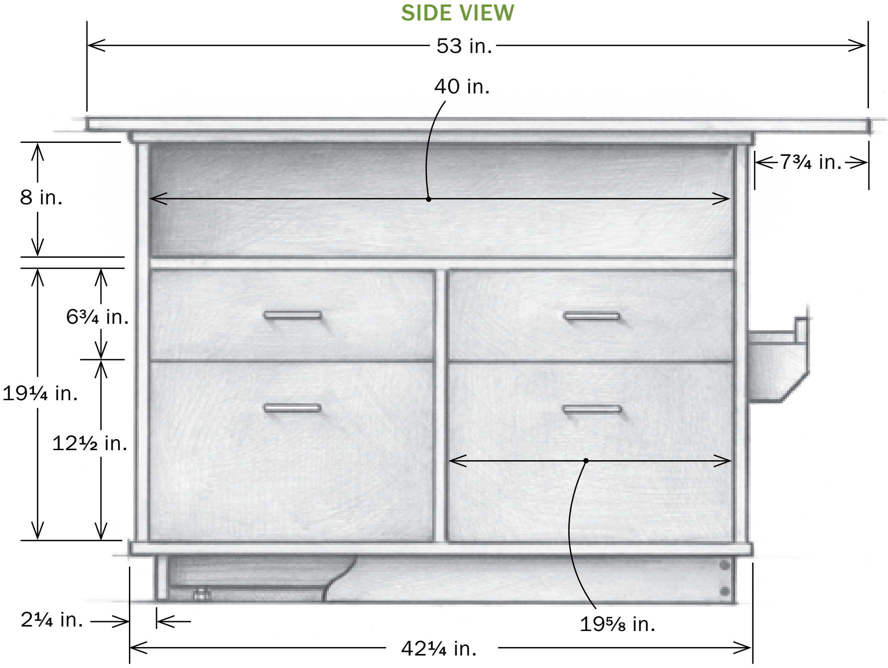


Full-size plans for this outfeed table (including plywood cutting diagrams) are available at FineWoodworking.com/PlanStore.

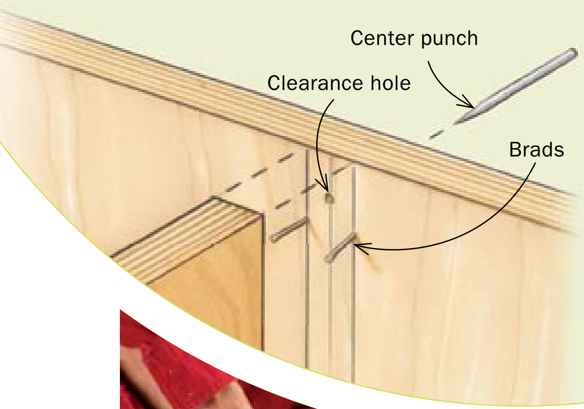
END VIEW



SIDE VIEW



Drawings: Bob La Pointe



JOINERY TIPS

Careful layout of joint locations and a few well-placed brads take the fuss and frustration out of butt joints. The layout lines show you where to drill, and the brads act as a third hand to hold the panels steady as you mark screw locations.



Drill along the centerline. *Two lines show the edges of the intersecting panel. The third line marks the centerline for the clearance holes.*



Brads are helping hands. *Brads driven in along the edge lines will hold the intersecting panel in place as you transfer the location of the clearance holes. A pair at the top and at the bottom is all you need.*



Transfer the pilot-hole locations. *With the two panels aligned and held in place, slide a center punch through the outer panel and tap it to mark locations for the pilot holes. Disassemble the parts and drill the holes.*

tabletop to toughen it and seal it against stains and glue.

A guide for square panels

You can't rely on the factory-cut edges being square to each other, and full sheets are hard to handle on the tablesaw anyway. Solve both problems by using a circular saw and cutting guide to break down the sheet into smaller workpieces.

Set the guide so that it cuts an edge square to a factory edge. Use a sanding block to clean up the two square edges and then measure and mark the panel's final dimensions. Trim it to size on the tablesaw, running the square edges along the fence.

Bevel all edges on the panels with a chamfer bit. This prevents damage to the panels and adds a bit of safety. A square phenolic edge is very sharp and easily can cut you. Beveled edges also create crisp shadow lines at the joints, which I like.

Screw joints are solid

All of the table's joints, except those in the drawers, are simple butt joints held together with screws. Where they wouldn't



Use a drill to start the screws. *Drive in the joint-connector bolts, leaving them about ⅛ in. proud of the panel.*

Hand torque brings them home. *Use an Allen wrench to drive the bolts flush with the panel. A drill might over-drive the head or strip the pilot hole.*

LOGICAL ORDER FOR ASSEMBLY

Start with the center and end panels because everything else is built around them. The bottom keeps these parts square and stable while you attach the rest of the components.



Start with the core. *Assemble the end panels and center panel, and trace their locations onto the bottom. Mark centerlines, drill holes for the drywall screws, and then attach the bottom.*



Add the dividers. *Attach the shelf divider first. Then install the flange (see drawing, p. 38) and drawer divider.*



The sled shelf is next. *Drive joint-connector bolts through the end panels into the sled shelf. Use drywall screws to secure the shelf to the drawer and shelf dividers.*



Flip the cabinet to attach the feet. *Lag bolts screwed into Douglas-fir runners make easily adjustable feet. After flipping over the cabinet, attach the runners with drywall screws.*

be visible, I used drywall screws. Where the screw heads are exposed, I used joint-connector-bolt wood screws (www.mcfeelys.com, #1423-CWB), which have large, bronze-colored heads that look good on shop furniture. Although these are called bolts, they're actually hefty wood screws that need aligned clearance and pilot holes drilled before you drive them home (see photos, p. 39).

Butt joints can be hard to align and assemble, so I use a couple of tricks to make things easier. First, I mark where one panel butts against the other. With these lines drawn, it's easy to tell where the joint is located and to drill accurate clearance or pilot holes along the centerline.

TABLE TOPS IT OFF

Attach the phenolic top from below. That way, its smooth surface is unbroken except for the miter slots, which provide clearance for gauges and sleds.

Once the clearance holes are drilled, you need to transfer their centers onto the edge of the intersecting panel so that you can drill pilot holes. But it's not easy to hold everything in alignment when you do that, so I drive a few brads into the edge lines drawn earlier to trap the panel and hold it steady while I transfer the centers. I pull out the brads with a claw hammer when the joint is together. The layout lines and small nail holes left behind are hidden inside the case.

Assemble the table in stages

I built my table in stages to avoid accumulated errors, but some parts should be cut in groups for uniformity. The cabinet's center panel can be cut at the same time as the drawer and shelf dividers because they need to be the same height.

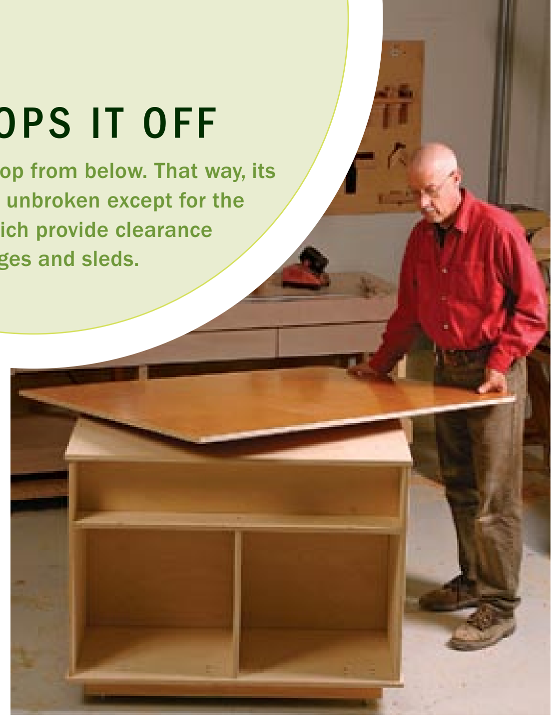
Begin by assembling the end panels and the center panel. Once they're joined and square to one another, get the dimensions for the bottom and subtop by measuring the assembly and adding ¾ in. to its width and length. The bottom and subtop overhang the core assembly by ⅜ in. on all four sides, which makes it easier to fit them because the alignment of the edges won't need to be exact. Attach the bottom, but not the subtop.

The drawer and shelf dividers are next. The shelf divider is simply screwed to the center panel. The back of the drawer divider, however, has a strip of plywood attached to it. Screws are then driven through the resulting flange to attach the drawer divider to the center panel (see detail, p. 38). This is necessary, because once the shelf divider is installed, you won't be able to drill through the center panel to attach the drawer divider.

After the dividers are in place, install the large shelf that provides storage for the sled. When you screw it down, keep the drawer and shelf dividers square to the center panel. Next, add the divider that serves as a back to the shelf.

You're now ready to attach the subtop, which adds stiffness to the phenolic top and makes it easier to screw it on. Before you attach it, drill and countersink a series of holes for the screws that will attach the phenolic top to the base. Drill them 6 in. apart around the subtop's perimeter and about 2 in. from the edge. Do the same around the center. Now, attach the small shelf on the side of the table. To keep things simple, I screwed the shelf to a pair of cleats, which are hidden by a skirt on the front edge.

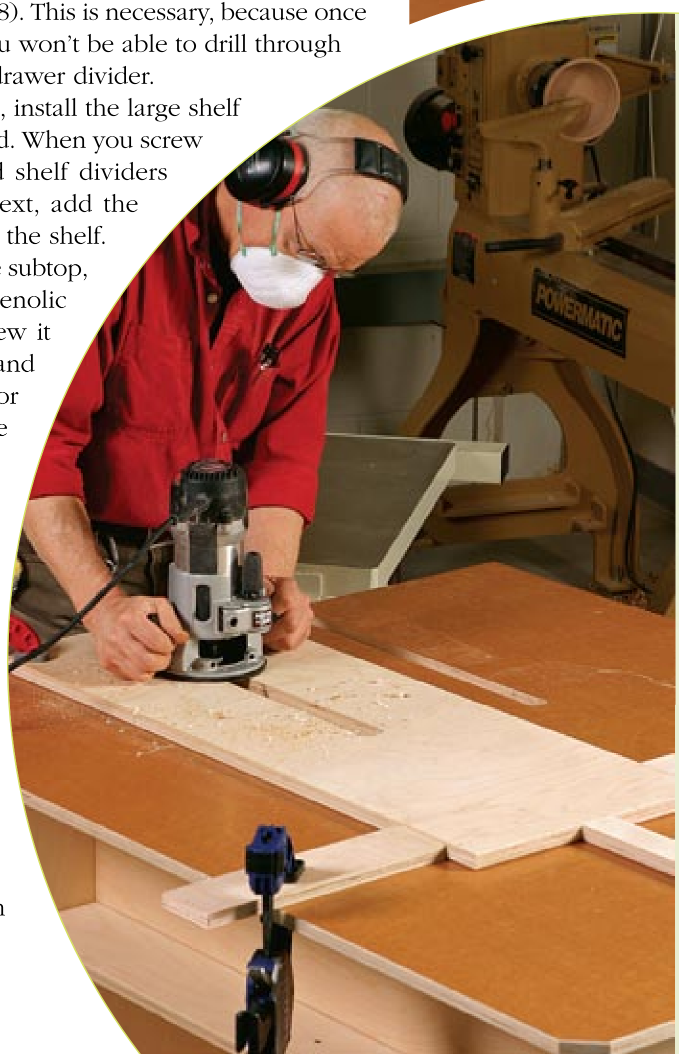
Flip over the base and attach the two runners that receive the table's lag-bolt feet. These runners are made from



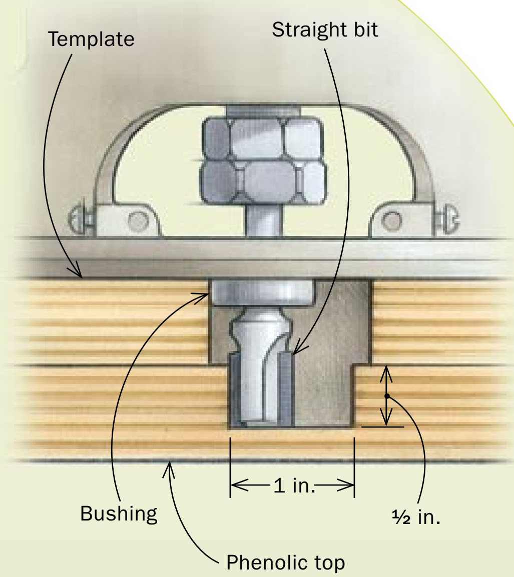
Screws shouldn't show. *After the table has been righted and the subtop attached, you can put the phenolic top in place. Secure it from below with drywall screws.*



Make way for the miter gauge. *Put the outfeed table in place—leveled and adjusted to the right height—and use the saw's miter gauge to locate the clearance slots.*



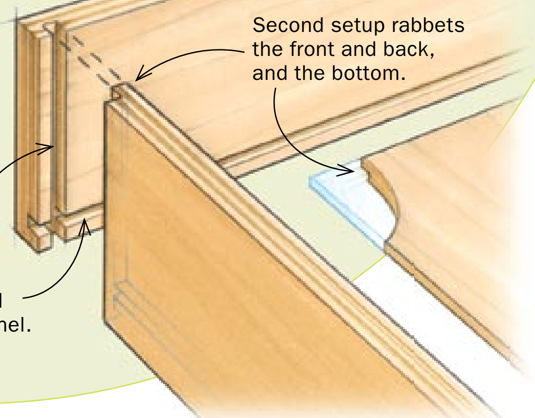
ROUT THE CLEARANCE SLOTS



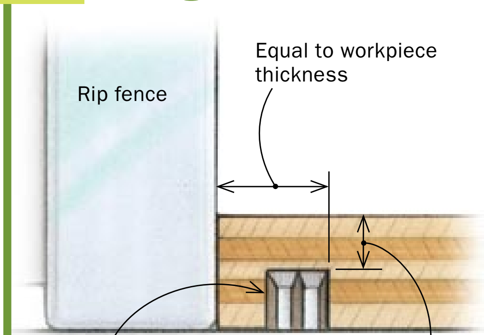
Jig makes quick work of wide slots. *White used a router equipped with a guide bushing and straight bit to cut the clearance slots. His method produces a wide, accurate slot without having to move a straightedge for multiple passes.*

SIMPLE JOINERY, STURDY DRAWERS

Build the whole drawer box with just two tablesaw setups, one for the grooves and one for the rabbets.



1 Dadoes and grooves



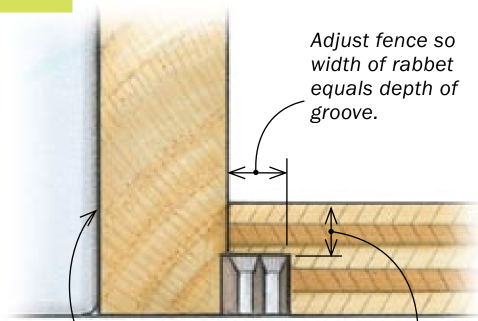


***Dadoes in the sides.** Use a miter gauge to guide the drawer sides safely along the rip fence.*



***Grooves for the bottoms.** Run the bottom of the sides, fronts, and backs against the fence to cut the groove for the bottom panel.*

2 Rabbets





***Rabbet the fronts and backs.** With the dado head buried in a sacrificial fence, cut the rabbets for the corner joints.*



***Rabbet the bottom panels.** All four sides of the bottom panels are rabbeted to fit into the grooves running around the bottom of the drawer box.*

Douglas-fir 4x4s trimmed to 2½ in. square. Drill pilot holes for the lag-bolt feet and screw them in, leaving them about 1 in. proud of the runners. The lag bolts allow you to adjust the table's height and to level it. Attach them 2¼ in. from the edge of the bottom.

Flip the base back over and attach the phenolic top. In addition to beveling the edges of the panel, I trimmed the two corners opposite the saw at 45°, which is easier to do with the top attached.

Next, level the cabinet and bring the top in line with the saw's table. Then transfer the location of the miter slots directly from the saw table and mark them out on the top. Mine are ½ in. deep by 1 in. wide by 20⅝ in. long. To cut the channels, you only need a router, a straight bit, and a straightedge, but I made a template and used an offset guide bushing, which allowed me to rout the entire channel without having to adjust a straightedge to get the full width.

For dust clearance, I drilled a ¾-in.-dia. hole about 6 in. from the end of each channel. The dust falls into the gap



***Assembly is easy.** Go easy on the glue to avoid squeeze-out. Use brads to hold things snug as the glue dries.*

between the back of the saw and the outfeed table.

A fast drawer joint that lasts

You can build the drawer boxes in a variety of ways, but I recommend a rabbet-and-groove joint that requires only two setups on the tablesaw. These drawers are quite strong and can be made in short order.

The drawer boxes are made from Baltic-birch plywood that's just a hair under ½ in. thick, but that doesn't mean the joint is harder to cut. You'll cut all of the dadoes and grooves with the first setup, and all of the rabbets with the second (see photos, facing page). The dadoes, grooves and rabbets are cut with a ¼-in. dado stack set at the same height, so you'll only need to reset the fence between setups.

The easiest way to assemble the drawers is to brush a small amount of glue on the rabbets (you want to avoid squeeze-out) and tack the joints together with two or three small brads. The brads will hold the joint snug as the glue dries. Clamping is time-consuming, and the weight and pressure of the clamps can throw the drawer out of square.

I used standard ball-bearing, full-extension slides from a home center to mount the drawers in the outfeed table.

Attach the drawer fronts and kick plate

Fit the fronts with the table in place and adjusted for height and level. The table might twist a bit as a result of the adjustments, and you'll get a better fit after them.

The four pieces of the kick plate are screwed to one another at the corners, but aren't attached to the cabinet. This makes them easy to remove should you need to tweak the table's height if you move the saw and table.

A few coats of shellac on the Baltic-birch plywood will give it some protection.

Your newly minted outfeed table will make your shop safer and better organized. And that will make your woodworking more enjoyable. □

A former shop manager at Fine Woodworking, *John White is now a freelance writer living in Vermont.*

ADJUST THE HEIGHT

The lag-bolt feet let you adjust the table to be level and just the right height.



Check for a consistent gap. *The outfeed table should be a hair below the saw table. Hold a straightedge firmly down on the tablesaw to check.*



Quick adjustments. *The coarse thread of the lag bolts makes for speedy height adjustments.*

CAP IT OFF

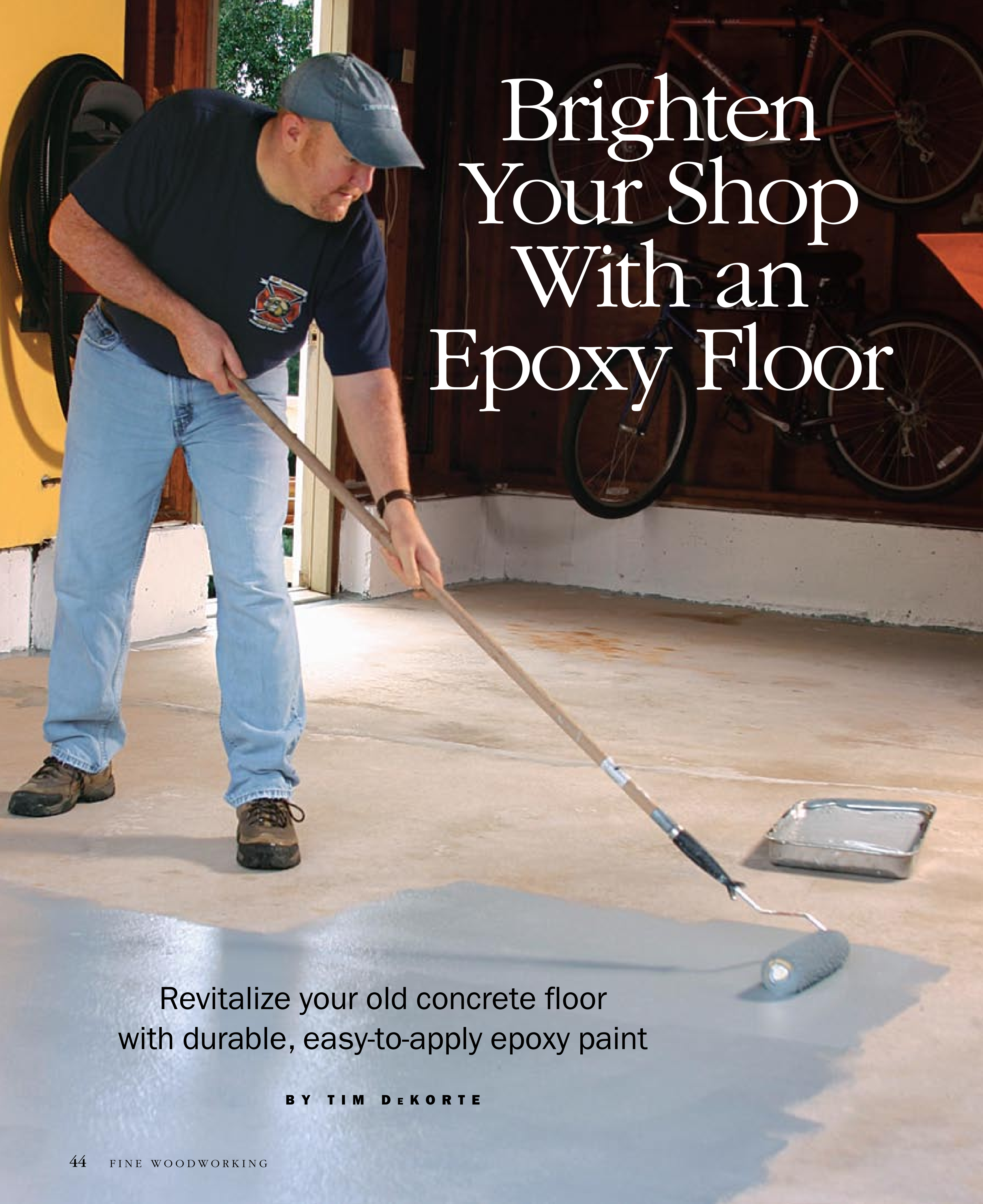
Phenolic drawer fronts and kick plates are durable, but also give the cabinet a unified look and subtle pop.



Add a kick plate. *The plate hides the feet and stops things from rolling under the cabinet. It's easy to remove to make height adjustments.*



Install the false fronts. *Use shims and double-faced tape to position each drawer front, and then screw it on from the inside.*



Brighten Your Shop With an Epoxy Floor

Revitalize your old concrete floor with durable, easy-to-apply epoxy paint

BY TIM DeKORTE

Patch and clean the surface

Before applying the epoxy, fill any cracks in the concrete and then clean the surface thoroughly. Be sure to wear safety goggles, gloves, and rubber boots during the cleaning process.





Fill the cracks. *Apply a concrete patch mix or hydraulic cement to eliminate large cracks.*





Fizzle while you work. *After wetting down the entire floor, mix the cleaning and etching solution in a plastic watering can and pour it onto the floor. The product should bubble and fizz as it cleans.*

We all know that concrete is murder on your feet and back. But its aesthetic drawbacks can be significant, too. Left unfinished, concrete has a parasitic tendency to feed on light, making you feel like you're always working on a cloudy day. And the porosity of the material gives stains a permanent home, so you'll forever see the scars from chemical and finish spills.

Though it won't address the physical torments concrete inflicts, you can give your garage or basement floor a face-lift by applying a two-part, water-based epoxy paint. The material goes on easily with brushes and rollers, and once cured, the epoxy provides a light-reflective surface that brightens the entire shop and is very resistant to scuffing and shop chemicals. With this system, it's also super simple to create nonskid areas to make strenuous tasks like handplaning less like an extreme sport. You also have the option of adding some pizzazz with colored flakes. What's more, at about 25 to 30 cents per square foot at most home centers, epoxy won't put a large dent in your wallet.

Clean the surface, then give it some bite

Before applying epoxy to your shop floor, you'll need to remove all items from the space and fill any noticeable cracks in the floor. You'll also have to clean the concrete and profile the surface. The floor kits come with a cleaning and etching solution that will eliminate





Use a stiff-bristle brush to scrub the floor. *Working in one small area at a time, scrub in one direction, then the other to remove stains and other contaminants. Rinse each area after it's been scrubbed. If you have an older floor with lots of stains, you may have to repeat the entire process to ensure the surface is ready for painting.*



EVERYTHING IN ONE PACKAGE

Two-part epoxies can be purchased in kits, available in the paint aisle at most home centers. The kit typically includes the base, the hardener, color flakes, a cleaning/etching solution, and a stir stick.

any surface contaminants (like motor oil) that interfere with the paint's adhesion, and will texture the surface so that it's easier for the paint to grab and hold. If you are cleaning an interior floor, however, clean the surface with TSP (trisodium phosphate) instead of the cleaning/etching solution, and be sure to follow the directions on the label.

After cleaning the surface, let it dry. In most cases, 24 hours is enough. One simple way to determine if the surface is dry enough is to tape an 18-in. by 18-in., 4-mil clear plastic sheet firmly over the surface for 16 hours. If you see condensation under the sheet at the end of the test, you'll need to wait a bit or speed up the drying time with fans or a dehumidifier.

Dealing with painted concrete—If you have a painted floor that's in good shape, you can skip the etching process and simply clean the surface using an all-purpose cleaner (coating manufacturers will recommend a product). Then you can use a floor sander with rough-grit paper to eliminate any glossy areas and to give the surface some tooth. Clean up the sanding dust thoroughly, and be sure to wear a good-quality dust mask or respirator.

If the existing paint is peeling, you'll have to remove all of it and start the process from the beginning. In this case, hire a professional shot blaster to remove the old coating and profile the concrete. This could run from $1.50 to $2.50 per square foot, depending on the size of the floor.

Mix it up and roll it out

You don't have to don a chemical suit to apply these water-based epoxies, but you should have plenty of ventilation and consult the product application instructions on proper safety precautions.

For application, you'll need the requisite painting gear. Buy a mid-grade brush, 2 in. or 3 in. in size, for cutting in, a ⅜-in.- or ½-in.-nap polyester roller, along with a roller frame and pole.

Painting is the easy part

After mixing the two components (hardener and base), the chemical makeup of the material changes (a process called cross-linking), creating a durable, heat- and scuff-resistant paint film that goes on easily.



A + B = E-P-O-X-Y. *Two-part epoxy must be mixed together. Pour the hardener into the base and stir it using a mixer attachment for a drill. Once it's mixed, set it aside to allow the cross-linking process to complete, which typically takes about 30 minutes.*







No coffee breaks. *You have about 2½ hours to apply the epoxy, so work quickly and efficiently. Start at the edges using a brush to get into corners and tight places (1). Switch to a roller and work in small, 2x6 sections at a time, rolling in one direction (2) and then going over the area lightly in the other direction to achieve a smooth, level coat (3).*

Photos: John Tetreault

Get a grip

Left as is, the epoxy coating will be slick if sawdust or moisture is on the surface, so broadcast a nonskid material between coats where needed, such as near a jointer or workbench. Some manufacturers sell a grit additive, but fine play sand works just as well.





Broadcast the sand while the paint is wet. *After painting a section, use a handheld fertilizer spreader to distribute the sand evenly. You may want to practice on a tarp or other area.*



Roll on a second coat. *After the first coat dries (about 12 to 24 hours after application), apply a second coat over the sand particles. Once that coat dries, you'll have a gritty, nonslip surface that will last for many years.*

Time of day matters—If you coat concrete as the temperature rises, air within the slab will expand, potentially causing bubbles in the paint. That's why you should coat the floor during the cool-down cycle of the day. As long as the surface temperature is descending, and it remains within the product's application recommendations, you should get a bubble-free coating.

Mix the hardener and base—These epoxy coatings have two components (the base and the hardener) that must be mixed together. The mixture must be set aside for 30 minutes to cross-link, a process that changes the chemical makeup of both ingredients to create a coating that ultimately will cure to a rock-hard film.

Work fast—Once the mix is ready, you'll have about 2½ hours to lay it down before the epoxy goes bad. Cut in the edges first and then use rollers for the bulk of the work. Because these products are formulated to be somewhat self-leveling or at least have very good flow qualities, the rolling process should be easy. Get a good wet coat on the surface in one direction, then roll in the opposite direction using a light touch. To ensure even coverage, it's best to work in small 2x6 sections.

Online Extra

To see other shop-flooring options, go to **FineWoodworking.com/extras.**

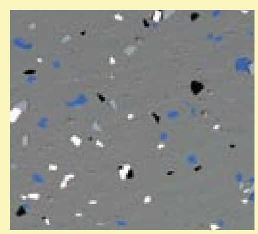
If you are planning to add a nonskid area, it's best to broadcast the fine sand into the wet first coat and top it with a second coat. A handheld whirlybird-type fertilizer spreader will distribute the sand uniformly.

Now allow the surface to cure according to the manufacturer's instructions. Often, you have to wait almost a day to walk on the surface or to recoat it. If you are applying a second coat, which creates a more durable surface, brush and roll it on in the same manner as the first. If you want to add sparkle with paint chips, add them to the surface while the final coat is still wet.

COLORFUL OPTION



Paint chips added to the final coat help hide imperfections in the floor and kick up the appearance. Use an underhand motion to distribute the flakes evenly.



Return the tools, and get to work

Follow these application guidelines, and you'll have a shiny new floor that should give years of service without peeling or delaminating, even after cars, bikes, and various tools have rolled in and out of your garage. When the paint does wear down, you can recoat without all the major prep work needed for the initial coating. You just need to clean the surface and repaint. □

Tim DeKorte is a coatings manufacturer's technical representative and a hobbyist woodworker in Santa Maria, Calif.



Who's Got the Best Riving Knife?

Finally, this safety feature is required on tablesaws, but manufacturers approach it differently

BY ROLAND JOHNSON

What's so special about these saws?

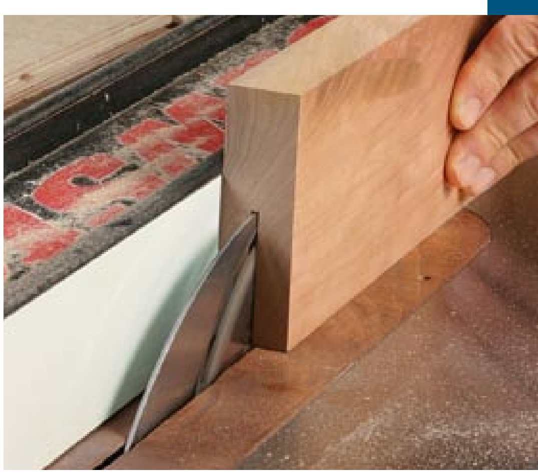
New tablesaws are outfitted with interchangeable riving-knife systems (high- and low-profile) that are better at protecting you from kickback than the splitters of old. The high-profile system helps protect against both kickback and hand-to-blade contact. For certain operations, when the high-profile knife can't be used, the low-profile riving knife can be substituted in seconds. For more benefits, see pp. 54-55.



High profile for maximum safety. *For routine cuts, the high-profile system—with its riving knife, blade cover, and pawls—provides the highest measure of safety.*









Choose low-profile when high-profile can't be used. *For some cuts, the blade cover interferes with the operation. These include narrow rip cuts (left), and non-through-cuts like slotting (bottom left) and using a tenoning jig (bottom right). The low-profile knife stays just below the top of the blade, but gets you the same kickback protection as the high-profile system.*

Tablesaws are getting safer, thanks to a long-overdue Underwriters Laboratories (UL) standard, effective in 2008, that requires all newly designed tablesaws—from benchtop models to full-size cabinet saws—to include a riving knife as part of the blade-guard system. (Models put to market before 2008 can be sold without a riving knife until 2014.) All manufacturers are working to meet the standard, and most are starting with their flagship cabinet saws. Due to patent laws, companies have taken different approaches, so I recently tried the new systems, head to head, to see who has the most convenient and accurate new safety equipment.

Before I get to that, however, it helps to understand how a riving knife makes a tablesaw safer.

Riving knife prevents dangerous kickback

Used properly, tablesaws are safe machines. Most woodworkers operate them without ever having a serious injury. But a tablesaw can make you pay dearly for inattention or lapses in judgment. In 2001 alone, the tablesaw sent an estimated 38,000 woodworkers to hospital emergency rooms,

Features that matter

according to statistics from the U.S. Consumer Products Safety Commission.

Based on lots of anecdotal evidence, we know many visits are the result of kickback, the dangerous event that typically occurs when a workpiece inadvertently contacts the back teeth of the spinning sawblade and is fired back into the face, neck, hands, arms, or torso of the operator. Plus, in certain instances, kickback can cause a hand to be drawn into the blade. A riving knife goes a long way toward making you safer from kickback.

Much like a splitter used on older tablesaws, a riving knife is a thin, stiff, steel plate installed from above the tabletop, just behind the sawblade. Both mechanisms are meant to prevent kickback, but a riving knife has big advantages over a splitter when it comes to safety and convenience.

The problem with splitters—Walk into any small woodworking shop and chances are you won't see a splitter on the tablesaw. That's remarkable when you consider that woodworkers as a group are pretty safety conscious. The problem isn't with us, it's with the poorly designed splitter systems that have been around for decades. Ask any woodworker and you'll get three reasons why splitters are less than ideal, and why most splitters spend their days sheltering spiders in a dark corner of the shop.

First, while they reduce kickback, splitters aren't suitable for the way small-shop woodworkers use a tablesaw. We constantly switch from ripcuts to crosscuts, narrow cuts to wide cuts, and rabbet cuts to dadoes. We cut miters, bevels, slots, grooves, and more. The splitter doesn't adapt easily to all those different cuts. Second, once the splitter is removed, it's a chore to replace. Wrench work is the norm, and the process is slow. Third, because of the way splitters mount to a saw, they end up too far from the sawblade, and that increases the likelihood of kickback.

On the other hand, a riving-knife system has two interchangeable knives. If one won't work for a cut, the other will. Also, both types fit close to the blade, making them better suited to reducing

IN OR OUT IN AN INSTANT

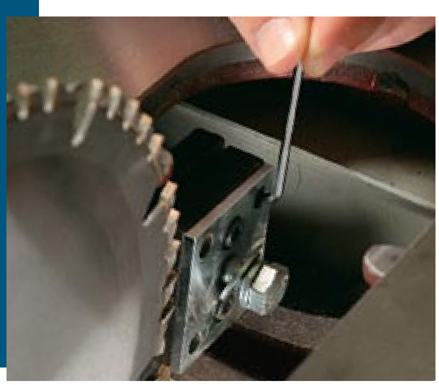




Look for knives that can be removed and replaced easily. If the process is slow, you're less likely to use them. All these riving knives had decent changeout times, but not all were equal. Wrenches slow the process (top); Delta's front-of-table release is convenient (bottom).

EASY-TO-ALIGN KNIFE





To work effectively, the knife must align with the blade. Even though it's essentially a one-time procedure, you don't want this adjustment to be a chore. Shims (above) take more time; screws (right) provide control and simplicity.





USER-FRIENDLY BLADE COVER

The cover should stay up when raised, so that you can peer down over the blade to align it with a cut line. The cover should lift easily, and let you see the cut as you feed a workpiece into it. Aluminum (upper left) makes that difficult. Clear covers (left) are better.

Photos: Tom Begnal

First look: 8 riving knives

Johnson collected the first eight riving-knife cabinet saws to come to market, and then spent several days in the *Fine Woodworking* shop giving just the knife systems an up-close look. All of them were acceptable, but some stood out from the crowd.

GENERAL 650R

www.general.ca

Street price: $3,000

Knife adjustment: Very good

Switch-out simplicity:
- Low-profile: Very good
- High-profile: Good

Blade-guard system: Good





Low-profile knife gets very good marks. *It couldn't be easier to add the low-profile knife; just insert it into the holder. You don't even need to remove the throat plate (above). To remove it, take out the plate and pull out a locking pin.*



On the General, it's easy to replace the low-profile knife, simply by pushing it into its holder. To remove it, though, you must remove the throat plate. Then you just pull a spring-loaded pin and pull out the knife. It gets a little fussier to change out the high-profile knife. That's because the throat plate can't be removed entirely with the blade cover in place. So the plate has to be partially lifted and tilted so that your hand can reach a spring-loaded locking pin. Four setscrews and four locking screws allow the knife-holder to be adjusted and locked. The aluminum blade cover is extra sturdy but makes it difficult to see the cut line.

GRIZZLY G0651

www.grizzly.com

Street price: $1,700

Knife adjustment: Fair

Switch-out simplicity: Fair

Blade-guard system: Good



Bolt action. *To attach a knife to the Grizzly saw, insert it into the holder (make sure the shims are in the right place) and tighten the hex bolt with the supplied wrench.*



For knife alignment, the Grizzly uses a fixed knife-holding block. Metal shims are used to make side-to-side adjustments, but there's no way to adjust the knife if it's not parallel with the blade, short of bending it by hand. Ours needed bending, but I aligned it just fine. Both the low- and high-profile knives are removed by taking off the throat plate and loosening a single hex bolt. (The wrench is on one end of the arbor-nut wrench.) To attach a knife, insert it into the holder and retighten the bolt. That's easy, but the shims slowed the changeout when I had to fuss with them. The blade guard is user-friendly.

JET 708675PK

www.jettools.com

Street price: $2,150

Knife adjustment: Very good

Switch-out simplicity:
- Low-profile: Very good
- High-profile: Fair

Blade-guard system: Good



Toolless changeover. *Swing a lever to lock or unlock the Jet knives.*



Jet has a knife-holding block with four setscrews for adjusting the knife-to-blade alignment. You only have to align it once; two additional screws lock the assembly in place. To remove the low-profile knife, lift out the throat plate and then swing a lever handle to the open position. Changing out the high-profile knife isn't as easy because the throat plate can't be removed all the way with the blade cover in place. You must partially lift and tilt the plate to get your hand under the guard to reach the lever handle. The blade guard is user-friendly.

8 saws with riving knives (continued)

LAGUNA MTS0200-0180

www.lagunatools.com

Street price: $1,600

Knife adjustment: Very good

Switch-out simplicity: Fair

Blade-guard system: Good



Wrench work. *Attach a knife to the Laguna saw by tightening a single hex bolt.*



Four setscrews are used to adjust the knife-to-blade alignment on the Laguna. You only have to align it once; two socket-head screws secure the block to the arbor casting. To change knives, first remove the throat plate, then use a wrench (not included) to loosen a single hex bolt. Slip in the new knife and use the same wrench to tighten the bolt. Replace the throat plate and you're ready to cut. The blade guard is user-friendly.

POWERMATIC 2000

www.powermatic.com

Street price: $2,700

Knife adjustment: Very good

Switch-out simplicity:
- Low-profile: Very good
- High-profile: Fair

Blade-guard system: Good



Flip the lever. *It takes just a flip of the lever to lock or unlock a knife on the Powermatic 2000 saw.*



Like its cousin, the Jet saw, the Powermatic uses four setscrews to adjust the knife-holding block, and two more screws to lock the assembly once it's adjusted. To remove the low-profile knife, first take out the throat plate, then swing a lever handle to the open position. As with the Jet, changing out the high-profile knife isn't as easy, because the throat plate can't be entirely removed with the blade cover in place. You must partially lift and tilt the plate so that you have room to slip your hand under the guard and reach the lever handle. The blade guard is user-friendly.

SAWSTOP 31230

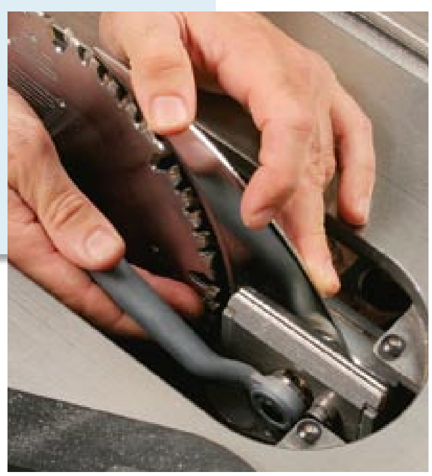
www.sawstop.com

Street price: $3,200

Knife adjustment: Good

Switch-out simplicity: Very good

Blade-guard system: Good



Likable lever. *The generously sized lever on the SawStop helps simplify the task of removing and replacing knives.*



A pair of socket-head screws allows only side-to-side blade alignment. Any lack of parallelism between the knife and blade (our saw didn't have any) requires hand-bending the knife. Not high-tech, but it will work. With the throat plate removed, the knives are easily locked and unlocked using a large lever. Lift up to lock; push down to unlock. The blade guard is user-friendly.

STEEL CITY 35905

www.steelcitytoolworks.com

Street price: $1,350

Knife adjustment: Very good

Switch-out simplicity: Good

Blade-guard system: Good



Knob does the holding. *To tighten (or loosen) the knives on the Steel City saw, rotate a knob about 1½ turns.*

The Steel City saw uses four setscrews to adjust the knife-to-blade alignment. To remove a knife, lift out the throat plate and turn a spring-loaded locking knob about 1½ times. Once loosened, pull the knob and remove the knife. I'd have liked a bigger knob, because it's not always easy to loosen once tightened. The blade guard is user-friendly.



OUR FAVORITE SYSTEM

DELTA UNISAW

www.deltamachinery.com

Street price: $2,900
(not yet finalized)

Knife adjustment: Very good

Switch-out simplicity: Excellent

Blade-guard system: Very good

The new and completely redesigned Delta Unisaw has a wonderful riving-knife system. Unlike all the other saws in this group, Delta uses one knife for both the high-profile and low-profile systems. In the raised position, with the blade cover and pawls attached, it's a high-profile knife. But remove the cover and pawls, lower the knife, and it transforms into a low-profile knife. And you don't need to remove the throat plate for any of the steps: The controls are at the front of the saw. Large "horns" on the cover make it a little easier to raise and lower, and it allows excellent sight lines. You align the knife to the blade with four setscrews that adjust a knife-holding block. Once the blade is adjusted, two more screws lock it in place. The saw won't be available until March 2009.









One knife is two. *For a low-profile knife system, simply release the locking mechanism at the front of the saw and push the knife down to the lowest position. (left and center). To convert to a high-profile knife (right), release the lock, raise the knife, and attach the cover and pawls. The changeover takes just seconds.*

kickback. And you can switch from one to the other in no time. No more excuses for not having a riving knife on your saw.

Why are there two types of riving knives?— Riving knives can be broadly classified into two types: high profile and low profile. A properly equipped tablesaw should have one of each.

Typically, a high-profile riving knife is longer and taller than the low-profile version. All that extra area serves mainly as a surface for attaching a blade cover and pawls. Together, the three parts form the blade-guard system. Equip a tablesaw with this system, and you have the best possible defense against both kickback and hand-to-blade contact.

The top point of the high-profile knife is above the highest point of the blade, so there are times when a high-profile riving knife can't be used. For example, when cutting a groove, the blade cuts only partially through the thickness of a workpiece. If you were to try that cut with a high-profile knife, the knife would get in the way. The high-profile knife also interferes with the use of a crosscut sled or a tenoning jig.

That's where the low-profile knife comes in. The topmost point of the knife is just slightly below the highest point of the tablesaw blade, allowing you to make any non-through-cut with the knife in place. Also, you can use it with a crosscut sled and tenoning jig. In short, the low-profile knife works for every tablesaw cut except when using a dado set. Indeed, you could put a low-profile knife on a saw and seldom have to touch the knife again.

To find out how the riving-knife systems compared on the newest 10-in. cabinet saws, I looked at the Delta Unisaw, General 650R, Grizzly G0651, Jet 708675PK, Laguna MTS0200-0180, Powermatic 2000, SawStop 31230, and Steel City 35905. Check pp. 51-53 for the summaries.

A new era in safety

All of the riving knives on these saws are winners in my book. Each makes the saw a lot safer from kickback, and I'd gladly take any of them over a tablesaw with no riving knife.

Overall, though, my favorite is the Delta. It's especially easy to switch from a high-profile to a low-profile knife and back again without removing the throat plate. I also liked the blade cover because the side guards can be lifted independently out of the way for good sight lines and quickly dropped back in place for good protection. Light, compact, and easy to remove or replace, the Delta Unisaw's riving-knife system gets my vote as the best in this group. ☐

Roland Johnson is a contributing editor.

Closer look at a safety revolution

The splitter has been around for decades. It makes a tablesaw safer, but not nearly as safe as a riving knife, because there's always too much space between the front edge of the splitter and the teeth at the back of the sawblade.

A riving knife, on the other hand, is mounted close to the sawteeth, typically ⅛ in. to 3⁄16 in. away. And when you raise or lower the blade, the knife moves along with it, always staying the same distance from the teeth (see diagram at far right). Also, unlike some splitters, the riving knife stays with the blade even when it's tilted to make bevel cuts. Splitters have another disadvantage: They're fussy to remove for certain operations (see facing page), and just as fussy to replace. That's why many of them end up collecting dust in a corner of the shop. A riving knife goes on and comes off in seconds.

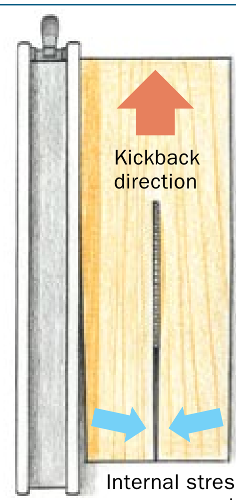
Online Extra

To watch tablesaw kickback in action, go to **FineWoodworking.com/extras.**

FIRST, UNDERSTAND KICKBACK

Most kickback occurs for two reasons: Either the sawkerf closes and pinches the teeth at the back of the blade, or the workpiece pivots and contacts those same teeth. Splitters and riving knives are intended to prevent both of those events.

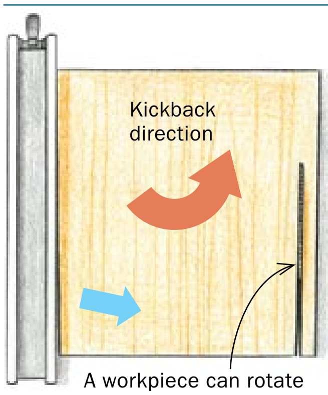
KICKBACK FROM BINDING





Pinch protection. *A splitter or riving knife fills the kerf, so if the wood starts to close, it pinches the splitter or knife, not the blade, preventing kickback.*

KICKBACK FROM PIVOTING

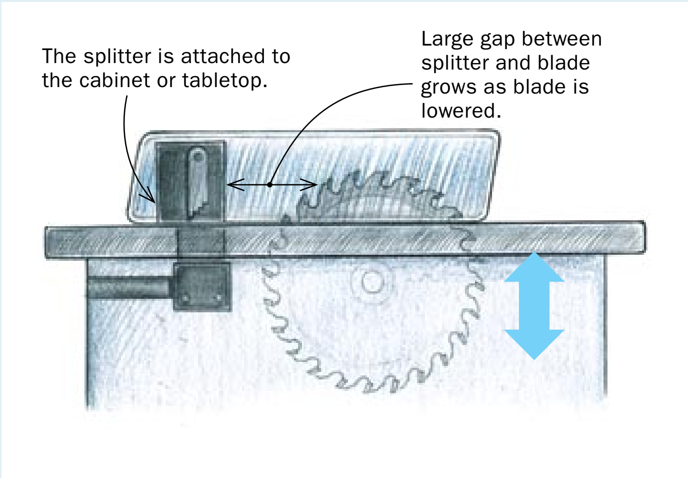




Pivot protection. *A workpiece that inadvertently pivots into the teeth at the back of the blade is likely to go airborne. A splitter or riving knife acts as a barrier to prevent that contact.*

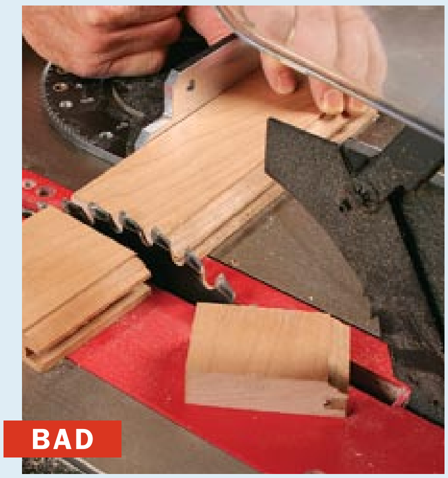
Drawings: John Tetreault

OLD-STYLE SPLITTER VS. RIVING-KNIFE SYSTEM



LARGE GAP MEANS LESS PROTECTION

A splitter doesn't move with the blade, so it's not uncommon to have a big gap between splitter and blade. That space could allow a workpiece, or a workpiece cutoff, to contact the teeth at the back of the blade.



SPLITTER MUST BE REMOVED OFTEN

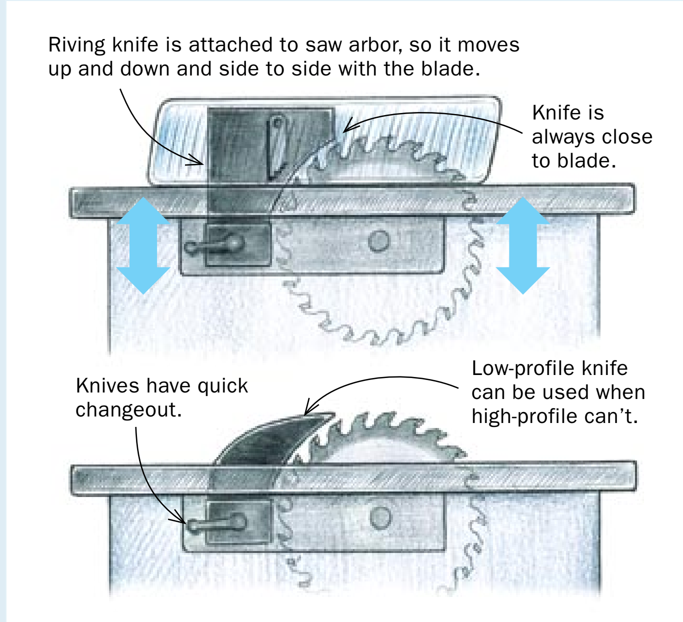
For many operations, the splitter system must be removed because it interferes with the cut. Once it's off, you lose all protection from kickback.



A CHORE TO REMOVE AND REPLACE

Most splitters take too much time to remove or replace. Because of the inconvenience, it's too easy to leave them off permanently. No splitter, no kickback protection.







SMALL GAP MEANS MORE PROTECTION

A riving knife remains close to the blade all the time, so there's never a big gap between the two. Therefore, there's little chance for a workpiece to contact teeth at the back of the blade.



PROTECTION WITH ANY TYPE OF CUT

For operations when the high-profile riving knife interferes with a cut, it's an easy matter to replace it with a low-profile knife and still have kickback protection on the saw.



CHANGEOVER IS EASY

Riving-knife systems are designed to be added, removed, and interchanged with a minimum of fuss. So there's never a good excuse for running the saw without a riving knife. And with the knife in place, you always have kickback protection.

15 Tips for Basement

FWW's online audience weighs in on muffling noise, stifling dust, adding light, and reducing moisture

In medieval times, miscreants and criminals were tossed into the bowels of a dungeon for their offenses. Below ground, these dungeons were dark, dank, foreboding places, characterized for centuries as hideous homes for torture or cramped imprisonment.

It may be a stretch to compare a basement shop to a dungeon, but they do have similarities. Like a dungeon, a basement is a hole in the ground and attracts all manner of moisture, with issues such as mildew, rust, even small floods. Basements aren't flooded with natural sunlight, either; single incandescent fixtures are the norm, usually scattered where you don't need them. On top of that, basements are where household items go to die, so space is tight.

Still, for lack of an alternative, many woodworkers set up shop in the basement and have to deal with any or all of these medieval horrors. To help them out, we asked our extensive and experienced online audience for tips on making a basement workshop drier, brighter, and more space-efficient. We also asked folks how they prevent noise and dust from infiltrating the living areas above.

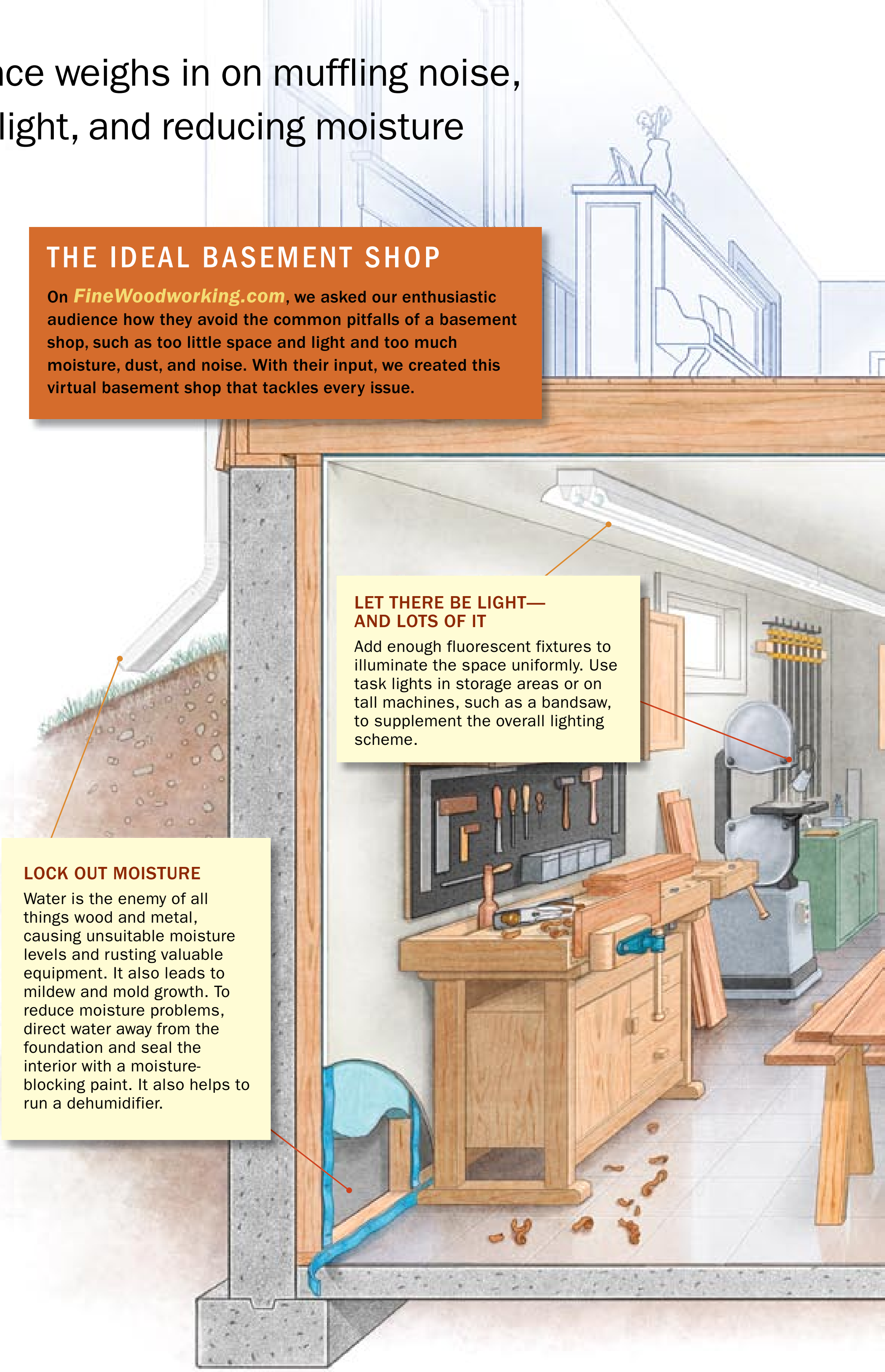
The response was overwhelming, and we got plenty of nifty solutions to common problems. We used those ideas to create a virtual basement shop that is as comfortable to work in as it is unobtrusive to the rest of the household.

How to keep moisture at bay

Basement walls are concrete, a porous material that allows moisture penetration if you don't take measures to stop that migration. It's well worth

THE IDEAL BASEMENT SHOP

On *FineWoodworking.com*, we asked our enthusiastic audience how they avoid the common pitfalls of a basement shop, such as too little space and light and too much moisture, dust, and noise. With their input, we created this virtual basement shop that tackles every issue.



LET THERE BE LIGHT—AND LOTS OF IT

Add enough fluorescent fixtures to illuminate the space uniformly. Use task lights in storage areas or on tall machines, such as a bandsaw, to supplement the overall lighting scheme.

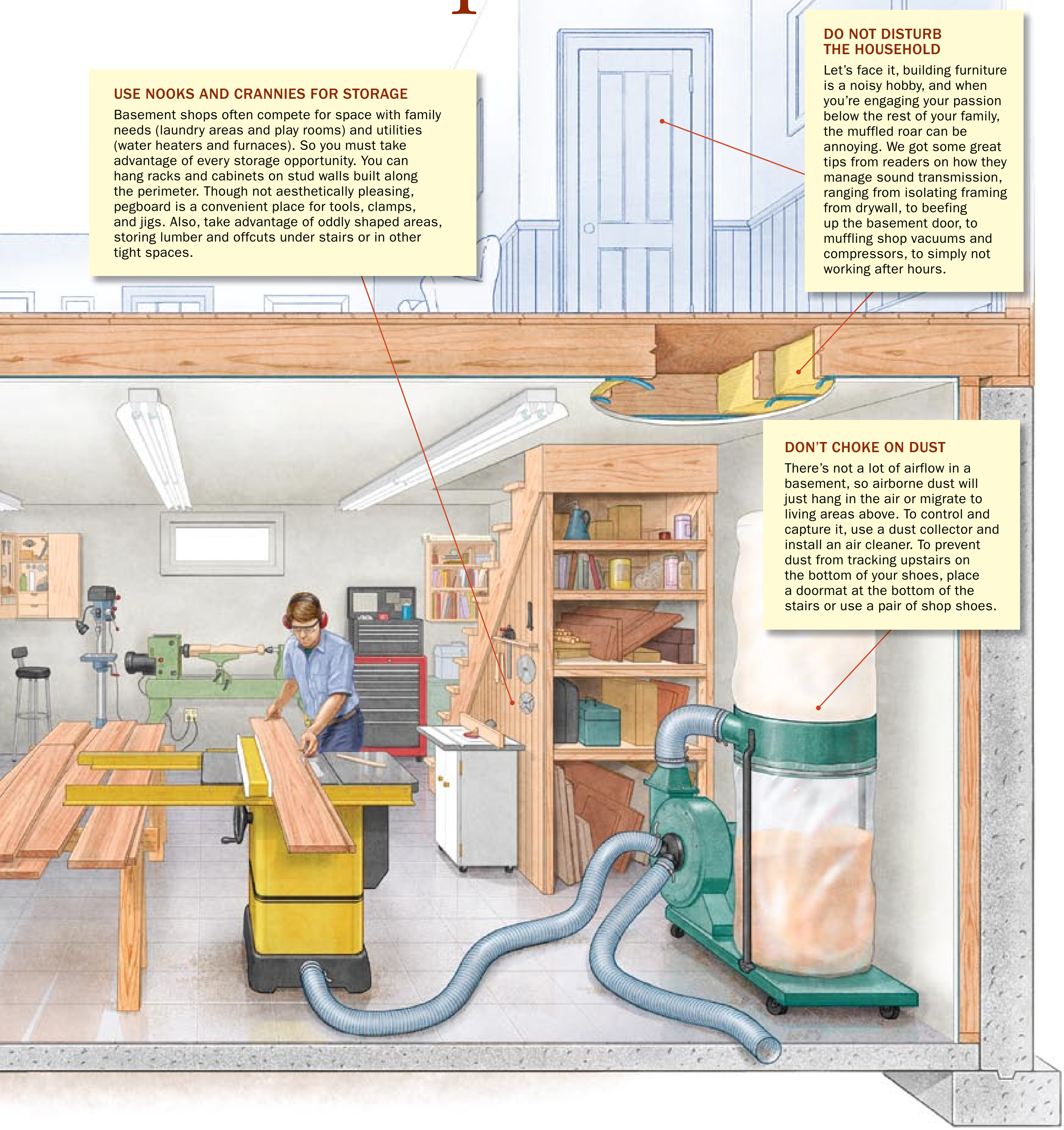
LOCK OUT MOISTURE

Water is the enemy of all things wood and metal, causing unsuitable moisture levels and rusting valuable equipment. It also leads to mildew and mold growth. To reduce moisture problems, direct water away from the foundation and seal the interior with a moisture-blocking paint. It also helps to run a dehumidifier.

Photos, except where noted: staff; drawings (this spread:) John Hartman

Workshops

BY THOMAS McKENNA



USE NOOKS AND CRANNIES FOR STORAGE

Basement shops often compete for space with family needs (laundry areas and play rooms) and utilities (water heaters and furnaces). So you must take advantage of every storage opportunity. You can hang racks and cabinets on stud walls built along the perimeter. Though not aesthetically pleasing, pegboard is a convenient place for tools, clamps, and jigs. Also, take advantage of oddly shaped areas, storing lumber and offcuts under stairs or in other tight spaces.

DO NOT DISTURB THE HOUSEHOLD

Let's face it, building furniture is a noisy hobby, and when you're engaging your passion below the rest of your family, the muffled roar can be annoying. We got some great tips from readers on how they manage sound transmission, ranging from isolating framing from drywall, to beefing up the basement door, to muffling shop vacuums and compressors, to simply not working after hours.

DON'T CHOKE ON DUST

There's not a lot of airflow in a basement, so airborne dust will just hang in the air or migrate to living areas above. To control and capture it, use a dust collector and install an air cleaner. To prevent dust from tracking upstairs on the bottom of your shoes, place a doormat at the bottom of the stairs or use a pair of shop shoes.

Defend against wetness



To reduce moisture levels in the shop, coat the walls and floor with a moisture-sealing paint, such as Drylok, and add a dehumidifier.

the effort, though. Here in the Northeast, for instance, many basements are moist, and folks who have basements are familiar with the term "musty." In summer, there's an odor in the basement that's impossible to miss but hard to pinpoint. In winter, the cold, moist air can chill even your fingernails. And the moisture does not just create an uncomfortable working environment. It also will rust your tools and increase the moisture content of lumber to undesirable levels.

If you get standing water regularly, you may have issues that need to be addressed by a professional waterproofing contractor before placing expensive tools and materials in harm's way. But if you simply have a damp space, there are many ways to fight the fog.

Look outside—If you're battling moisture, the cause may be rooted outside the house. Check that the house gutters are not clogged and that the downspouts are directed away from the foundation. Where possible, try to grade the property so that it slopes away from the house. This may be easier said than done.

Get a dehumidifier—One of the first things we heard from our online responders was to add a dehumidifier. You can get one at any home center. Depending on the size, the cost will run from about $150 to $250. When you install the dehumidifier, make a habit of emptying it regularly, especially during the humid summer months.

Seal walls and floor—You can reduce moisture by sealing the walls and floor with a moisture-blocking paint, such as Drylok or Damplock. These thick coatings have the added benefit of giving the area a bright face-lift that reflects light.

Guard against rust—Finally, you can fight rust directly by placing desiccants in tool drawers or coating surfaces lightly with paste wax (rubbing waxed paper on machine tabletops works, as shown in "Protecting Surfaces in the Shop," *FWW* #167).

Fight dust and noise migration

Dust is a known carcinogen, so it's important to prevent as much of it as possible from floating around. If you work in a basement, the dust also becomes a nuisance upstairs, as it will migrate into living areas. So get a dust collector and an air cleaner to help keep the particles at bay. You'll also appreciate the fact that there will be less to sweep up.

Brighten the space

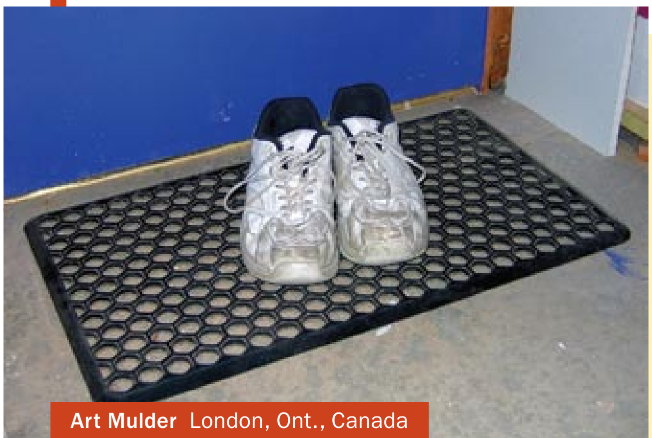


Dave Verstraete Grandville, Mich.

For even illumination, Verstraete added banks of fluorescent lights. *He also laid down light-colored tiles and painted the walls white to add reflectivity. "When I switch on the lights in my basement shop, it feels like I am outside on a sunny day," he says. Although uniform lighting is the goal, some taller tools, like a bandsaw, cast inconvenient shadows. To eliminate those, use strategically placed task lights (right).*



Keep dust downstairs



Art Mulder London, Ont., Canada

These shoes were made for working. *Mulder uses a pair of shop shoes and a mat to avoid tracking dust into living areas.*



Dave Verstraete

Serious dust collection. *Most readers with basement shops agree: A dust collector and an air cleaner are must-haves. Verstraete uses a portable 2.5-hp collector, which provides plenty of capacity in a small footprint.*



Serge Duclos Delson, Que., Canada

Quiet cleaner. *Duclos, a frequent contributor to Methods of Work, says he's reduced vibration from his ceiling-mounted air cleaner by separating it from the joists with 6-in.-wide, ¾-in. plywood strips.*

Along with dust, a woodworker's passion for building things comes with another inhospitable by-product: noise. When you're working below the living area of your home, you must be mindful of others above. Our online survey uncovered some nuggets that help reduce the noise that can invade living areas.

You can launch a systematic, all-out offensive against sound, as Mark Corke did for us in 2004 ("Soundproof a Basement Shop," *FWW* #167). In that article, he showed how to frame and insulate the basement walls and ceiling to eliminate sound migration into the upper living areas. But there are smaller steps you can take to help turn down the volume.

Separate drywall from framing—One way to reduce sound transmission is to isolate the drywall from the framing. You can install resilient metal channel (www.truesoundcontrol.com) in the ceiling, as Corke did, but a cheaper alternative is stapling polystyrene sill sealer (available at home centers) to studs and ceiling joists to create a cushion between the wood and the drywall. Insulation between framing also will help reduce sound transmission; the higher the R-value, the better the insulation will dampen sound.

Put a lid on your compressor and shop vacuum—Although you can't put a muffler on your tools, you can reduce the output of two of the more annoying accessories in the shop: the compressor and the shop vacuum. By housing each of these in a soundproof chamber made of plywood and acoustic padding, you drop the noise level of each machine (see "Silence Your Shop Vac," *FWW* #195). Just make sure the box has enough holes or vents for airflow.

Get a better door—One of the unique aspects of a basement shop is that there's often a door leading directly to the living areas of the home. Choosing the right door, or modifying your existing one, can help reduce the amount of noise and dust that enters the home. For advice in that area, I turned to veteran *Fine Homebuilding* editor Chuck Miller, who's also a talented woodworker.

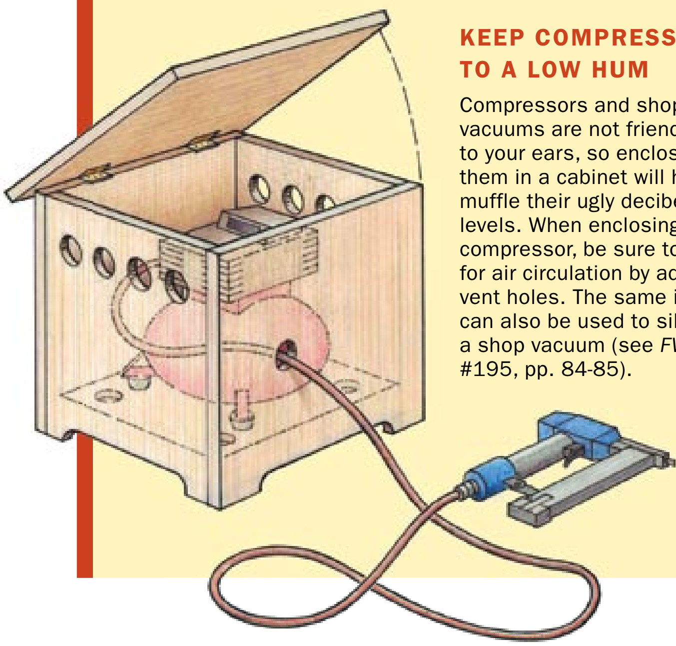
High-frequency noises generated by routers and shop vacuums get in through cracks, Miller says, while low-frequency sounds, such as those generated by a deadblow mallet on a workpiece, migrate through mass. Miller recommends treating the basement door as though it were an exterior entry, where you want to stop air infiltration.

Your first choice is install a heavy, prehung exterior door, with all the attendant weatherstripping in place. The weatherstripping will cut down on the high-frequency sound, and the mass of the door itself will muffle the low-frequency noise. If you don't want to add a new door, retrofit the basement

Reader shop photos, this spread: Art Mulder, Dave Verstraete, Serge Duclos

Keep it quiet

To contain noise and keep your family happy, try separating the drywall from the framing (right) and isolating screaming machines when possible (below). Another tip is to replace your hollow access door with a solid one designed for exterior use.



KEEP COMPRESSOR TO A LOW HUM

Compressors and shop vacuums are not friendly to your ears, so enclosing them in a cabinet will help muffle their ugly decibel levels. When enclosing a compressor, be sure to allow for air circulation by adding vent holes. The same idea can also be used to silence a shop vacuum (see *FWW* #195, pp. 84-85).



Robert Beason Longmont, Colo.

A cushion between framing and drywall. *Before installing the drywall in a basement shop, Beason suggests stapling sill sealer to the studs and joists to dampen sound migration.*



door with weatherstripping along the door stops, and add a vinyl sweep to the door bottom.

Pump up the lighting, and make the most of space

By their nature, basements don't get natural light, so you need a boost here. Typically, basement lighting schemes are not well-thought-out by builders. You often get a small handful of single bulbs scattered here and there. But you can change the lighting scheme to create a more inviting, comfortable work area.

The goal is to create uniform lighting from corner to corner, and fluorescent fixtures are the most economical way to do it. If you have existing incandescent fixtures, replace them with banks of fluorescent lights to illuminate as much of the space as possible. If you don't have existing fixtures and wiring, it's worth the investment to hire an electrician to run the wiring and install the fixtures.

To help with light reflectivity, paint the walls white and coat the concrete floor with epoxy paint (see "Brighten Your Shop With an Epoxy Floor," pp. 44-47). Another option is to lay down light-colored vinyl tile. Treating the floor not only helps with light reflection, but it also fights moisture and makes it easier to sweep up any debris.

If you need to, add task lighting at your bench or at machines that cast shadows on their own tables, such as a floor-standing drill press or a bandsaw. It's also beneficial to illuminate storage areas.

As with most woodworking shops, a basement can get filled with equipment quickly. But basement spaces can be small to start with, and often store stuff for everyone in the family, so storage for your lumber, tools, and accessories becomes even more of a challenge.

Many readers suggested using narrow or oddly shaped areas, such as the space under stairs, to store lumber and scraps. Those with larger basements built separate storage rooms around their furnaces and water heaters. This solution not only creates a neat storage option, but it also isolates the utilities from wood dust. Some folks simply store most of their wood outside or in the garage, bringing in stock as they need it.

Some readers built wood stud walls over the concrete surfaces, making it easy to hang cabinets, lumber racks, or other storage systems. The bottom line: Use spaces smartly, and you'll stay well organized and avoid mixing your lumber scraps with the laundry.

Working in a basement is not so bad

A basement may not be the ideal place to set up shop, but for many folks it's the best option.

Instead of toiling in a dungeon, you can create a clean, well-lighted place. In the end, you'll be more comfortable and so will your housemates—a win-win for everyone. □

Thomas McKenna is senior editor.

Drawing, this page: Vince Babak

Maximize storage



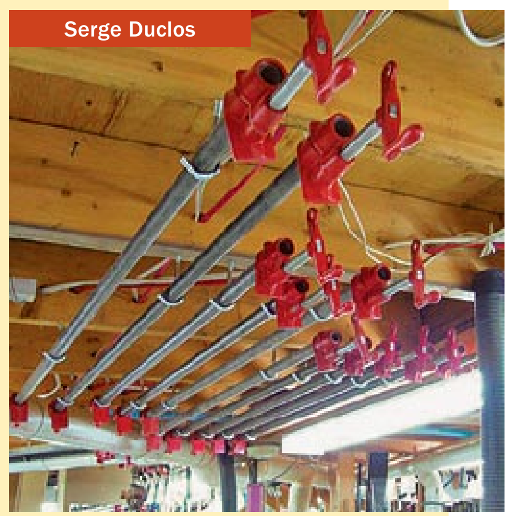
Chris Walvoord Chicago, Ill.

Perfect place for small parts. *Walvoord shares a basement with a family playroom and guest bedroom, so his space is ultra-tight. To make the most of it, he built shelves under his stairs to hold offcuts and jigs.*



Dave Verstraete

Don't overlook walls and ceilings. *Verstraete hung clamps on the wall (above), and put up pegboard near his workbench for jigs and tool accessories. Duclos hangs longer pipe clamps under the ceiling joists (below), leaving the wall free for other types of clamps.*



Serge Duclos





Robert Beason

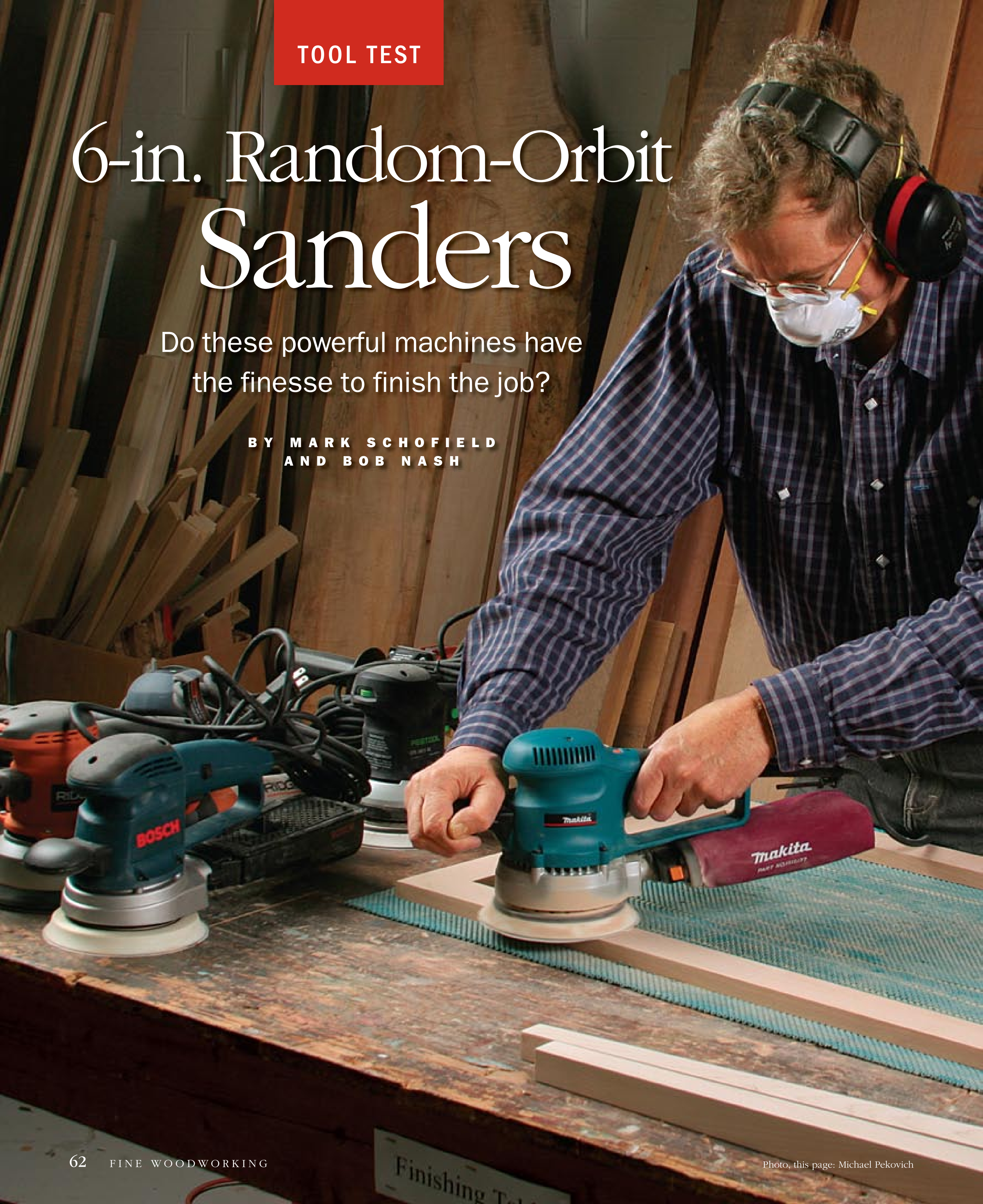
An alcove for lumber. *This area in Beason's basement is too small to work in, so he converted it to a lumber storage area. A rolling storage cart fits perfectly between the lumber rack and basement wall.*

Reader shop photos, this page: Robert Beason, Christopher Walvoord, Dave Verstraete, Serge Duclos

6-in. Random-Orbit Sanders

Do these powerful machines have the finesse to finish the job?

BY MARK SCHOFIELD AND BOB NASH



Photo, this page: Michael Pekovich

One inch doesn't seem like much, but when it comes to random-orbit sanders, it makes a large difference. For starters, the pad on a 5-in.-dia. sander is 19.6 sq. in., while that on a 6-in.-dia. model is 28.3 sq. in., giving you 44% more sanding surface. To drive this extra capacity, 6-in. sanders have more powerful motors, and many work in two modes—coarse and fine. The smaller sanders operate only in fine mode.

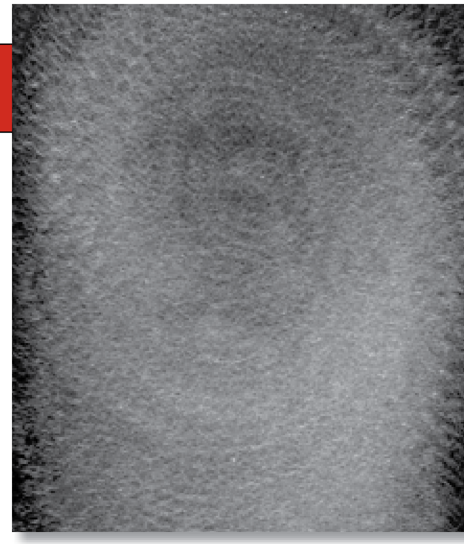
We wanted to find out what these larger sanders offer the typical furniture maker. Are the extra weight and cost justified by greater productivity? Can you easily control the tool when it's set on coarse mode, or will your crisp-edged workpiece end up looking like a piece of driftwood? How well do these tools deal with dust collection? What we discovered was a wide range of capacities and performances—far larger than the fairly homogeneous 5-in. sanders. Read on to see which model best suits your needs.

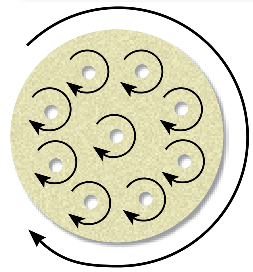
Let the sanding marathon begin

To test each sander's stock-removal rate, we used the same method Andy Engel employed to test 5-in. random-orbit sanders ("Random-Orbit Palm Sanders," *FWW* #185). We weighed an 8-in. by 24-in. cherry board on a scale accurate to 1 gram (28.35 grams = 1 oz.); then we sanded the board using a P100-grit hook-and-loop disk from Klingspor for exactly five minutes. Then we weighed the board again to

All offer random orbit

Like all random-orbit sanders, these 6-in. models have an eccentric spindle (the bottom end is offset from the top), rather like an engine crankshaft, attached to a balance weight that helps generate a centripetal (toward the center) force. The sanding pad itself rotates freely on the spindle, which you can verify by holding the running sander on its side and placing a small piece of wood against the disk; this will stop the pad's rotation, but not the orbit. When the sander is placed on the workpiece, friction between the workpiece and the pad causes the pad to rotate. It's the combination of the pad's rotation and orbit that creates an efficient, well-blended sanding pattern.

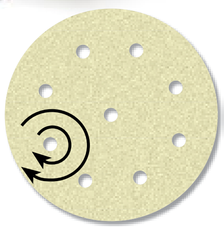




A random-orbit fingerprint. *The combination of an eccentric orbit and rotation of the pad creates the swirling, random scratch pattern.*



BIGGER ORBIT ...
Two of the sanders tested increase the rate of stock removal by increasing the diameter of the pad's orbit in coarse mode.



SOME GET MORE AGGRESSIVE

Of the six sanders equipped with a coarse mode, the Ridgid and the Metabo (left) achieve it by increasing the size of the stroke, or diameter of the pad's oscillation, from ⅛ in. to ¼ in. The larger the stroke, the more aggressive the action. Think about rubbing a bug splat off your windshield—the more tenacious the mark, the larger you tend to orbit the cloth. You can sometimes see the size of the stroke by putting a pencil dot on a sanding pad and then turning on the machine in random-orbit mode.

A greater increase in stock removal can be achieved by engaging a gearing mechanism. Instead of letting the sanding pad rotate freely, this mechanism allows the motor to drive the rotation, while keeping its orbital pattern. The Fein, Makita BO6040, Bosch 1250DEVS, and Festool RO 150 FEQ (right) all employ this combination of fast rotation and random orbit. It removes stock almost as fast as a belt sander or a grinder, but without the deep scratches, because the same piece of grit doesn't pass over the same section of wood even with the sander held steady.



... OR SET IT SPINNING
On other sanders, an aggressive rotary motion is achieved when a gear on the spindle engages a ring gear linked to the pad, forcing it to spin rapidly.



Thumbnail reviews

FESTOOL ETS 150/3 EQ

SINGLE MODE



This was the easiest sander to control, with no vibration or wobble, and one-finger control when using the onboard dust canister. With a vacuum hose attached, there was minor movement, but using a medium speed helped on narrow stock. Using the vacuum on minimum power reduced stock removal from 20 grams to 11, but the percentage of the dust collected by the vacuum rose from 93% to 100%. With its combination of ultra-smooth operation and good stock removal, the ETS 150 is our pick for best overall.

BOSCH 1250DEVS

DUAL MODE



Designed to be used only with a vacuum, this sander can be used in "turbo" eccentric-orbit mode for fast stock removal or in random-orbit mode for fine sanding. The turbo mode removed wood five times faster, but there was high vibration and wobble and it required the firm grip of two hands to keep control. Fine mode was much smoother, with only a slight rocking, but stock removal fell off sharply and the barrel required slight upward pressure to maintain full disk contact. The on/off switch is easy to use.

BOSCH 3727DEVS

SINGLE MODE



This sander operates in a fine, random-orbit mode only. With the onboard dust pickup, it was very easy to control, almost a one-finger operation. When sanding small surfaces, it worked best at medium speed (there was a slight up-and-down motion at full speed). The onboard dust canister was the most effective of all the canisters, picking up 86% of the dust. Full vacuum power sucked the machine to the wood (a problem), and minimal vacuum power reduced dust collection to 50%. For fine sanding, though, particularly if not attached to a vacuum, this machine deserves the best value award among single-mode sanders.

DEWALT DW443

SINGLE MODE



The loud grinding sound of this right-angle sander promised a high rate of stock removal. Instead, it operates only in fine mode with fairly modest stock removal, particularly when not attached to a vacuum. The on/off switch is awkwardly located on the barrel under your hand and it is hard to get your fingers between the barrel and the dust bag, which only managed to pick up less than half the dust. But when attached to a vacuum, not only did the rate of stock removal nearly double, but 97% of the dust was collected, second only to the Festool RO 150.

MAKITA BO6040

DUAL MODE



A right-angle sander with coarse and fine modes, the Makita is designed for use only with a vacuum, which may be just as well—it was the clear winner in the stock-removal test. In three timed sessions in coarse mode, it removed an average of 54 grams, nearly 70% more than the runners-up. But the BO6040 was hard to control even with two hands locked on, regardless of vacuum power. In fine mode, minimal vibration, wobble, and workpiece movement allowed one-handed operation. For fast stock removal, this is the best value among dual-mode sanders, even though the vacuum hose is a $54 accessory.

FEIN MSF 636-1

SINGLE MODE



With no speed control and an aggressive 5⁄16-in. stroke, this sander made us constantly fight for control. Even with two hands firmly on the tool there was a constant wobble. Considering the rough action, we expected the rate of stock removal to be higher than 18 grams (see test results, p. 67). On the other hand, the dust collection was pretty effective at 92% when attached to a vacuum (there is no onboard canister). Another drawback is the requirement to grease the eccentric head every 50 hours and the gears every 300 hours. None of the other sanders listed a similar maintenance requirement.

Photos, except where noted: Mark Schofield

FESTOOL RO 150 FEQ

DUAL MODE



The Festool Rotex can be switched from rotary motion for aggressive stock removal to random-orbital motion for fine sanding. Designed to be used only with a vacuum hose attached, it was quite a handful, particularly in rotary mode where even two hands couldn't prevent it from jumping and moving the workpiece. Even the random-orbit mode proved exhausting: The sander was noisy and rough-sounding, with a noticeable vibration that left our hands tingling. If you want fast stock removal, the Bosch 1250DEVS and the Makita BO6040 offer similar or better performance for half the price.

METABO SXE450 TURBO TEC

DUAL MODE



The Metabo changes from a ¼-in. stroke for fast stock removal to a ⅛-in. stroke for fine sanding. Changing modes involves pushing a button and turning the pad manually until you hear a couple of clicks. But there is no visual clue to which mode you are in and we found it difficult to tell one from the other, in part because neither was very aggressive. The Metabo had some of the lowest stock removal scores and the motor seemed to bog down if any more than light downward pressure was applied to the tool. The sander was easy to control, except in fine mode with the vacuum attached.

MAKITA BO6030

SINGLE MODE



The percentage of dust collected over the course of the three 5-minute tests fell from 79% to 50% using the onboard dust canister, for an average of 65%. When we repeated the tests, the percentage fell from 87% to 44%, for an average of 60%. We hoped a vacuum would give better results, but a hose made this sander nearly uncontrollable; it was sucked to the wood even with the vacuum at minimum power. For a fine-mode machine, this sander removes an impressive amount of wood, but it is troubling that so little of the dust can be collected.

RIDGID R2611

DUAL MODE



This is a close relative of the Metabo, with a similar dual-stroke random orbit and an identical weight, but there are some differences: Mode selection is done by sliding a button similar to the direction control on an electric drill, making a visual check easy, but the tool was not as smooth as the Metabo, with a slight wobble in the fine mode and considerable rocking and wood grabbing in coarse mode. The trigger-lock button for sustained operation was difficult to engage. The Ridgid boasts a soft start and a pad brake. Stock removal was faster than the Metabo.

see how much wood had been removed. We performed the test three times, each time with a fresh disk, and averaged the results.

Four machines have a fine setting only, one is exclusively coarse, and the remaining five were tested in both modes. All but one sander had variable speed control, but to maintain consistency, all the tests (see head-to-head results, pp. 66-67) were done with the sander at the maximum speed setting.

We also evaluated how effectively each machine collected dust, whether using an onboard system or hooked up to a vacuum. To test the former, we weighed the machine before and after each test, comparing the weight gain of the machine (and its dust cup/bag) to the weight loss of the board to calculate the percentage of dust that was collected. To see how well the sanders worked with a vacuum, we used a Festool vacuum with removable paper bags, weighing the bag before and after each test and comparing it to the change in the board's weight to calculate the percentage of the dust collected.

All this added up to 66 five-minute tests or 330 minutes of pure sanding pleasure. Not wanting to fight over this unique opportunity, the two of us intended to share the task. But we quickly found that the stock-removal rate varied considerably depending on an individual's sanding style, and in particular how much pressure he applied to the machine. To keep the comparison between different machines reliable, we decided to go with Bob Nash's lighter touch.

Can a big machine handle a narrow surface? A 6-in. sander might be perfect for flattening a tabletop, but how will it cope with narrow aprons or tapered legs? To find out, we also used each sander on a 2-in.-wide cherry frame and a maple leg that tapered from 2 in. to 1 in. We used both fine and coarse modes, at various speeds, with P100-grit and P180-grit disks. In general, the more aggressive the machine, the harder it was to control on a narrow surface. The best machines retained their fingertip control, while a two-handed grip with white knuckles couldn't



Head-to-head results

To test each sander's efficiency, we sanded a cherry board three times, five minutes each time. Holding the board in a jig minimized movement so that hand pressure could be applied evenly.

Noise test. *Nash used a decibel meter to measure the noise level produced by each sander.*

MODEL/SOURCE	STREET PRICE	WEIGHT (LB.)	MOTOR (AMPS)
BOSCH 1250DEVS www.boschtools.com	$250	5.3	6.5
AUTHOR'S BEST VALUE CHOICE BOSCH 3727DEVS www.boschtools.com	$150	5.2	3.3
DEWALT DW443 www.dewalt.com	$166	5.7	4.3
FEIN MSF 636-1 www.feinus.com	$440	3.7	3.2
AUTHOR'S BEST OVERALL CHOICE FESTOOL ETS 150/3 EQ www.festoolusa.com	$275	4.0	2.6
FESTOOL RO 150 FEQ www.festoolusa.com	$475	5.0	6.0
MAKITA BO6030 www.makita.com	$170	5.1	2.7
AUTHOR'S BEST VALUE CHOICE MAKITA BO6040 www.makita.com	$250	5.9	6.6
METABO SXE450 www.metabo.us	$165	6.0	3.8
RIDGID R2611 www.ridgid.com	$130	6.0	4.0





Stock removal. *Using scales accurate to 1 gram, a cherry board was weighed before and after each five-minute sanding test to calculate the amount of wood removed (above). To see how much dust was collected by the vacuum, it was weighed before and after each test (right).*



Onboard dust collection. *To determine the efficiency of the sander's onboard dust collection, the sander was weighed before and after each test.*

control the worst. The results for each machine are described in the thumbnail reviews (pp. 64-65) and the above chart.

While the coarse mode is undoubtedly more aggressive, can you tell which mode was used after a finish has been applied? To see, we sanded some cherry boards up to P220-grit with machines in both modes. We then applied a pigmented oil stain to enhance any sanding marks, sealed it with shellac, and applied three coats of water-based polyurethane. Various editors looked at the results and admitted that the panels were almost identical. We then tried the same test with tight-grained hard maple, and here the coarse-sanded surfaces were noticeably darker, indicating a rougher surface. Finally, to see the difference under a penetrating oil finish, we sanded some cherry boards and applied three

SANDING MODES	NOISE (DB)	WOOD REMOVED (GRAMS)		DUST COLLECTED (%)		HANDLING	
		ON-BOARD COLLECTION	VACUUM	ON-BOARD COLLECTION	VACUUM	WIDE STOCK	NARROW STOCK
Coarse	97	n/a	32	n/a	92	Poor	Poor
Fine	93	n/a	6	n/a	84	Good	Fair
Fine	96	7	13	86	95	Very good	Excellent
Fine	96	5	9	48	97	Good	Fair
Coarse	95	n/a	18	n/a	92	Poor	Poor
Fine	86	9	20	82	93	Excellent	Excellent
Coarse	95	n/a	32	n/a	89	Poor	Poor
Fine	95	n/a	13	n/a	98	Fair	Fair
Fine	87	15	n/a	65	n/a	Very good	Poor
Coarse	96	n/a	54	n/a	74	Fair	Poor
Fine	94	n/a	11	n/a	87	Very good	Good
Coarse	90	6	8	62	88	Very good	Good
Fine	86	3	3	67	92	Very good	Good
Coarse	92	9	10	73	93	Good	Fair
Fine	92	5	5	78	88	Very good	Good

coats of Waterlox Original wiping varnish. The coarse-sanded surface remained noticeably lower in luster even after three coats. So if you tend to use oil finishes, you'll want to avoid a final sanding in coarse mode.

Which 6-in. sander is right for you?

If you handplane like Garrett Hack or wield a scraper like Phil Lowe, you probably don't need a 6-in. random-orbit sander at all. But if you favor a power sander for removing machine marks, eliminating tearout, and bringing boards flush, then it may be time to invest in a 6-in. model. The single-mode Festool ETS 150/3 EQ and Bosch 3727DEVS combine a good rate of wood removal, especially when hooked to a vacuum, with easy control on wide and narrow surfaces. You could rely on either of these tools as your only sander.

The need for a sander with a coarse mode is harder to justify. On the one hand, most do remove wood quicker than a fine-mode 6-in. or 5-in. sander, but with the most aggressive machines you will have a serious fight on your hands each time you turn them on. The Makita BO6040, the Bosch 1250DEVS, and the Festool RO 150 FEQ all offer a high rate of stock removal. But you are likely to reach for another sander to handle narrow or confined spaces. □

Mark Schofield is the managing editor and Bob Nash is the shop manager for Fine Woodworking.

4 Bench Jigs for Handplanes

Accurate handwork is easier with these clever jigs

BY NORMAN PIROLLO



Like many woodworkers, I began with hand tools but quickly progressed to using machines for almost every aspect of my work. A few years ago, as I developed my woodworking business, I decided there must be a less dusty and more peaceful way to make furniture. I took courses at a woodworking school whose philosophy was all about hand tools. This experience opened my eyes; you might say I became a born-again woodworker. Safety was also a factor in my transformation. For example, it can be dangerous to machine small parts on a tablesaw or bandsaw.

Now, instead of hearing the drone and whine of machines and breathing dust all day, I listen to classical music and sweep up shavings at the end of the day.

While I do use machinery sparingly, productivity remains the key to any business, so I've had to make my handplaning efficient without sacrificing quality. I use a series of jigs for different planing situations. The jigs have ¾-in.-dia. dowels that fit into dog holes in my workbench. If your bench doesn't have dog holes already, you need to drill only two or three because all the jigs are interchangeable. The jigs and techniques I'll describe are by no means new—handplanes have been used for centuries—but I've added my own modifications. One of these is that I'm left-handed, so you'll need to flip the plans if you're a righty.

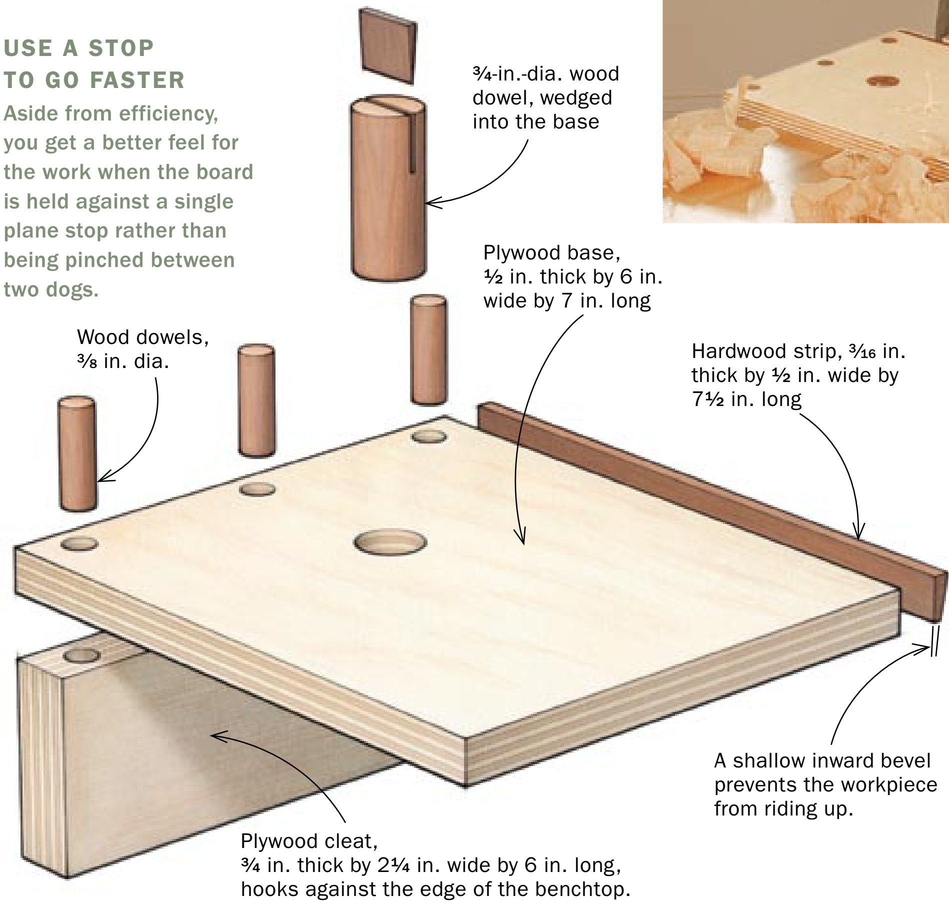
Norman Pirollo is the owner of Refined Edge Furniture Design in Ottawa, Ont., Canada.

1 Planing stop



USE A STOP TO GO FASTER

Aside from efficiency, you get a better feel for the work when the board is held against a single plane stop rather than being pinched between two dogs.



For face-planing boards at least ½ in. thick, I use a simple stop that is attached to the bench with a single dowel. To prevent the jig from pivoting in use, a cleat registers against the front edge of the bench.

After cutting out the two parts, clamp them together and place them on the workbench, centered over a dog hole. Insert a ¾-in.-dia. Forstner bit into the hole from the underside of the bench and use the spur to mark the location on the bottom of the jig base. Use the same bit to drill the hole on the drill press, and then use a ⅜-in.-dia. brad-point bit to drill three holes for the dowels that will connect the cleat.

Dowel stock varies fractionally in diameter; a slightly loose fit is fine in the dog hole, but you need a tight fit into the base of the jig. To ensure a good fit, I saw a kerf into the top of the ¾-in. dowel. I apply glue and insert the dowel, then compress a hardwood wedge into the kerf using the jaws of a vise, which locks the dowel in place.

When the glue is dry, insert the base into the dog hole, clamp on the cleat, square the base to the edge of the bench, and extend the ⅜-in.-dia. holes into the cleat. Glue in the dowels and, when dry, plane everything flush with the base.

On the working edge of the stop, I glue a strip of hardwood with a shallow inward bevel on its face to keep boards from slipping upward. I apply a single coat of oil finish to my jigs for looks and protection, but this is optional.



Locate the big dowel. *Center the base over a dog hole. Use a ¾-in. Forstner bit to nick the underside of the base where you will drill.*



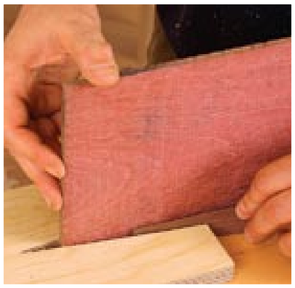
Drill for the others. *With a ⅜-in. brad-point bit, drill three holes at the front of the base for dowels that connect the cleat.*



Attach the cleat. *Insert the big dowel, ensure the base is square to the bench, then clamp on the cleat and extend the ⅜-in. dowel holes.*

Photos, except where noted: Mark Schofield, second from top: Norman Pirollo

2 Bird's-mouth stop



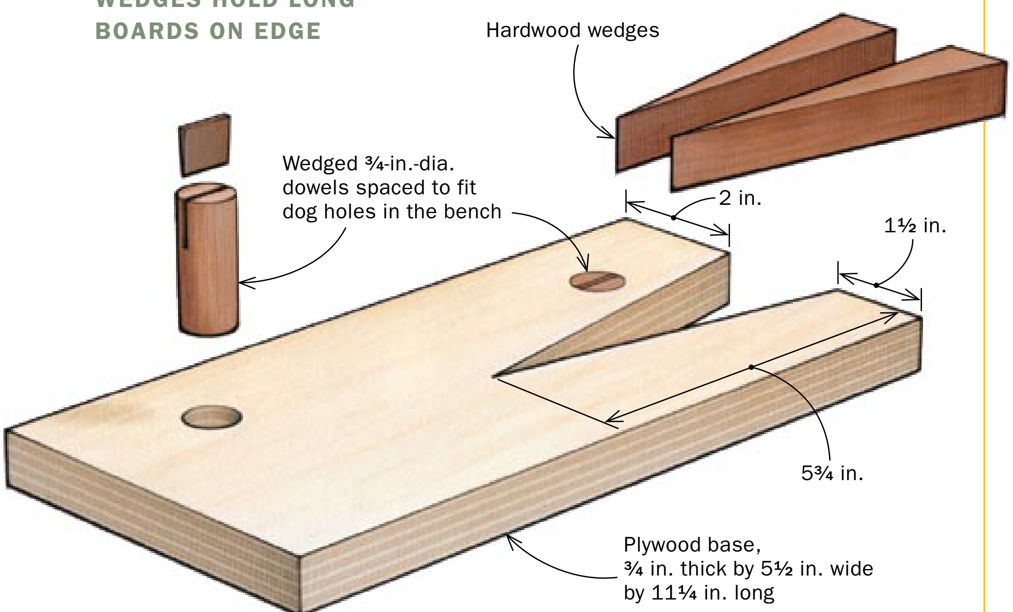
When edge-planing long boards, I employ a bird's-mouth stop. This attachment works remarkably well for holding a board on edge and is much faster than using a front vise, with or without a board jack.

Attached to the bench via two adjacent dog holes, this jig takes a bit more time to make than the last one, but the top two dowels give great rigidity and eliminate any tendency for rotation. Any board up to about 1½ in. thick can be inserted into the V-shaped slot in the jig and held in place with a small hardwood wedge on either side. The easiest way to make the wedges is to use the opening in the base as a template, cut the wedges on the bandsaw, and then clean them up with a handplane while holding them in a vise.



A flat surface. *Even if your benchtop isn't flat, the plywood base of the planing board provides a flat surface to plane on.*

WEDGES HOLD LONG BOARDS ON EDGE





***Edge-planing made easy.** A bird's-mouth jig allows you to rest the whole length of a board on the bench while you edge-plane it. If held in a vise, only a part of the board is supported.*



***Thin stock, no problem.** When planing stock less than ¼ in. thick, add an auxiliary base of ⅛-in.-thick Masonite so the plane will clear the stop.*

Drawings: Christopher Mills



3 Planing board

I reach for my planing board when working shorter or otherwise difficult workpieces. It combines a flat base with smaller versions of the first two jigs in this article.

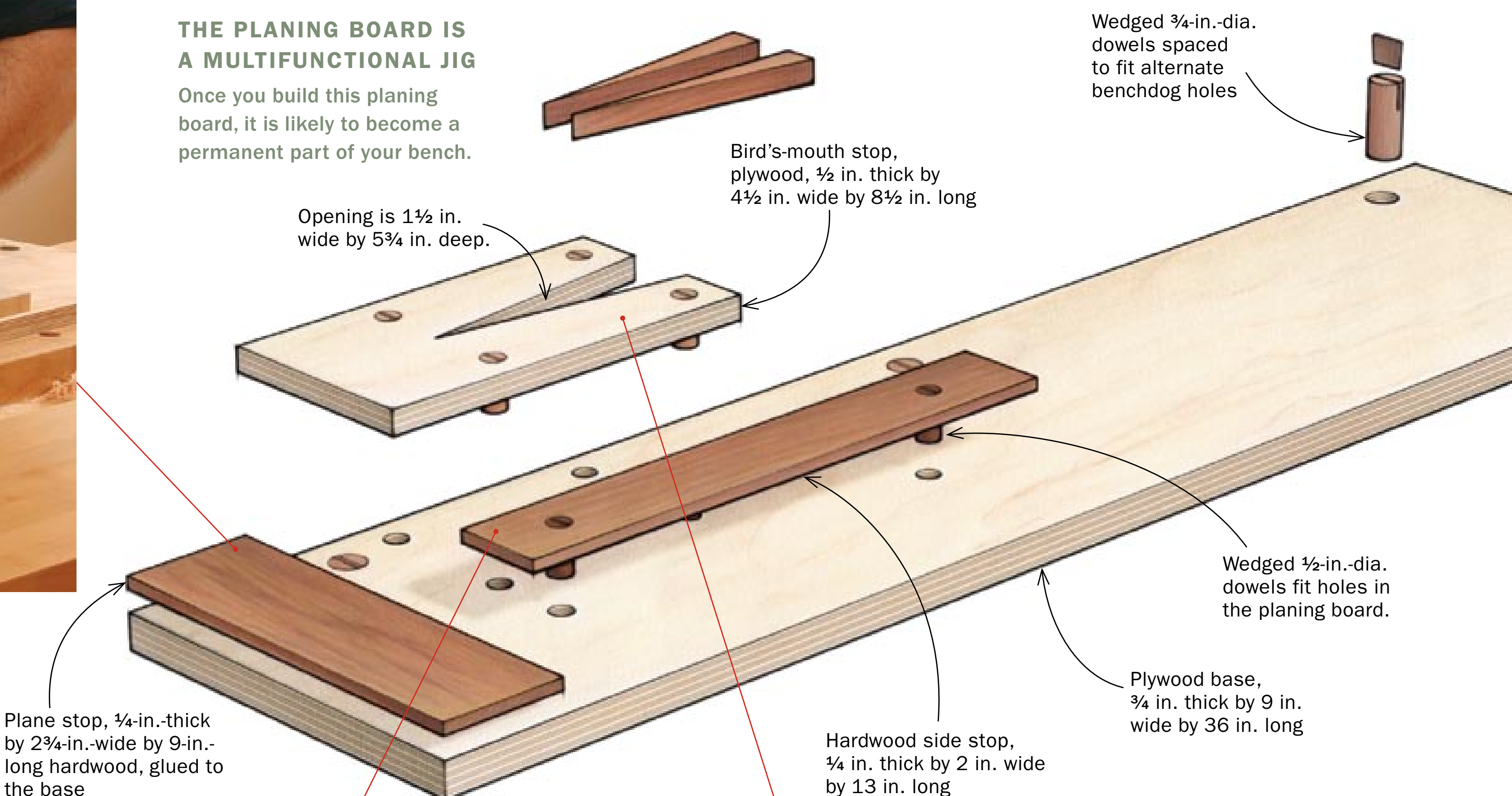
The planing board has two advantages. It guarantees a flat surface to plane on, even if the benchtop isn't flat. Also, it allows me to plane thin, narrow stock. I add a base of ⅛-in.-thick Masonite to plane stock less than ¼ in. thick instead of installing a thinner plane stop.

If I need to skew the plane slightly to lower the cutting angle and slice through difficult grain, I add a removable side stop that plugs into the planing board using two ½-in.-dia. dowels. This provides lateral support.

For jointing the edges of boards, I attach a smaller version of the bird's-mouth stop. In this way I can plane the face and the edge grain of a short workpiece without removing the planing board.

THE PLANING BOARD IS A MULTIFUNCTIONAL JIG

Once you build this planing board, it is likely to become a permanent part of your bench.





Side support. *When you need to skew the plane or plane across the board, use the side stop to support the workpiece laterally.*



There's more. *Once you've planed the face of the board, use the bird's-mouth attachment to plane the board's edge.*

4 Shooting board

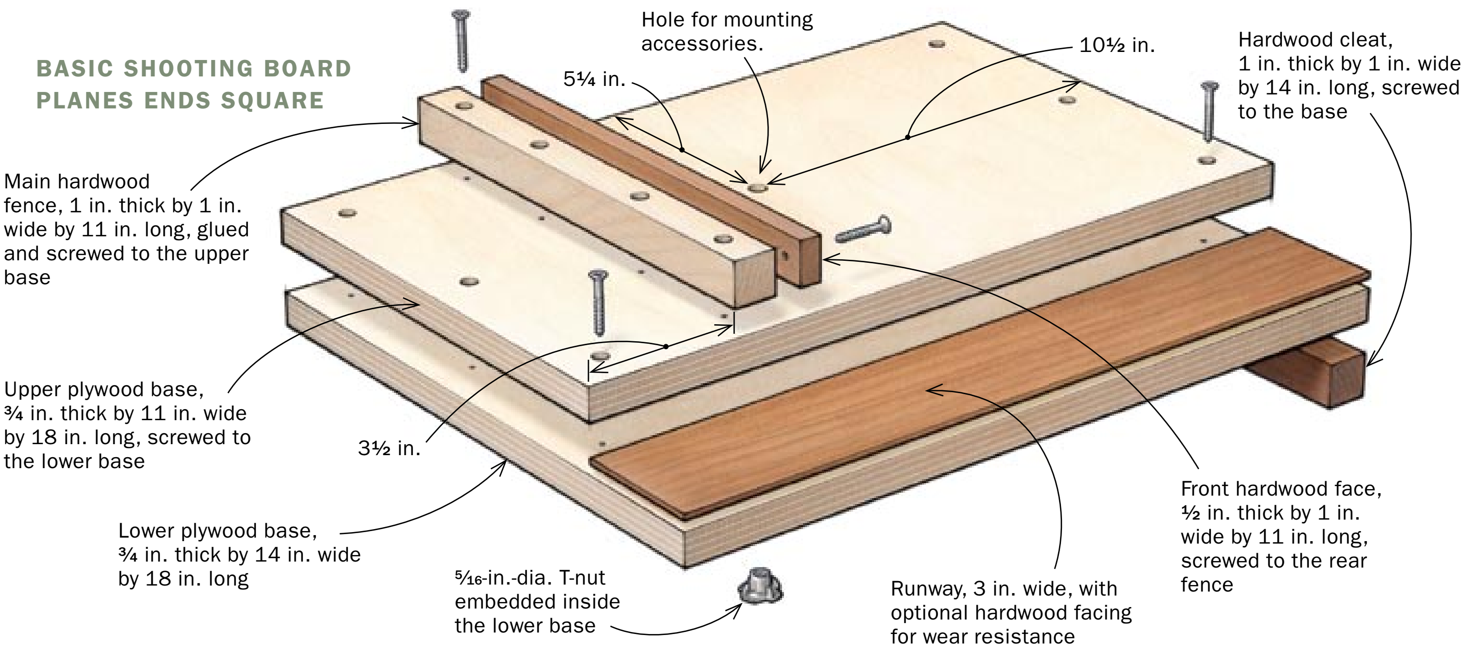


Square and true. *Place the board against the fence with the end fractionally beyond the end of the fence. Slide the plane past it, taking thin shavings until the end of the board is clean and perfectly square.*

When it comes to trimming the ends of boards, especially small ones, I turn to my shooting board. The jig, which hooks over the edge of the benchtop, consists of a base, a fence, and a runway for a handplane to glide along. The plane removes shavings in fine increments, leaving the board the correct length and the ends square and smooth, ready to be used in joinery.

The two-part fence, which supports the work and prevents tearout, must be exactly 90° to the runway and flush with the edge of the top base. The main fence is glued and screwed to the base, while the front face is screwed to the main fence so that it can be shimmed if needed. The best plane to use is a low-angle jack plane whose 37° cutting angle, long body, and large mass make it ideal for shaving end grain. Push the plane downward and toward the end of the workpiece with one hand, and use the other to secure the workpiece against the fence. This movement takes a little getting used to but soon becomes second nature.

BASIC SHOOTING BOARD PLANES ENDS SQUARE

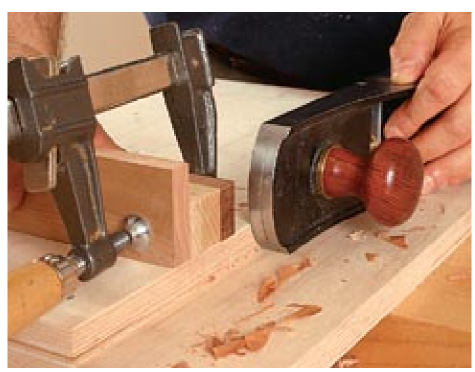




Make a runway for the plane. *The 3-in.-wide runway is formed by screwing the upper base to the lower base.*



A square fence is critical. *If the front face of the fence isn't 90° to the runway, you can shim it.*



Trim the end. *Before use, trim the fence flush with the edge of the top base. Clamp a piece of scrap to the fence to prevent tearout.*

TWO ACCESSORIES FOR PERFECT MITERS

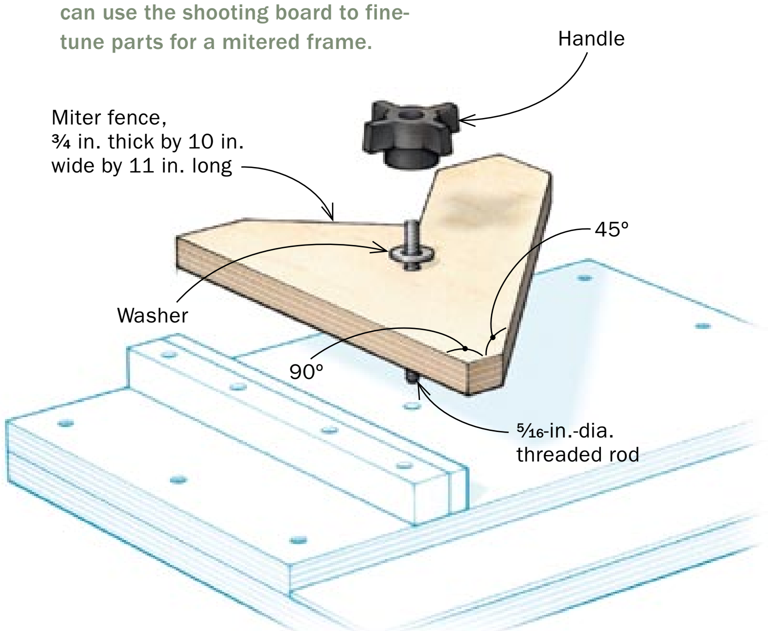
I recommend two easily installed attachments for this shooting board. The first is a triangular-shaped piece of plywood used to tune a flat, or frame, miter; the second is a larger block of wood with a face angled at 45°, used to trim a standing, or carcase, miter. Both attachments are held to the base using threaded rod that is screwed into a T-nut embedded in the underside of the jig. This group of easily constructed jigs leaves joints that surpass those left by a machine, and does it quicker.





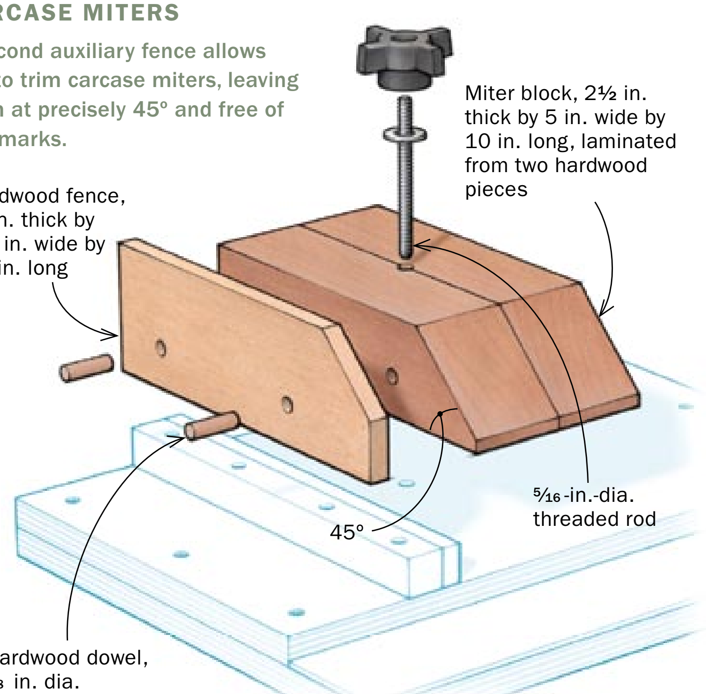
FRAME MITERS

By adding a 45° plywood fence, you can use the shooting board to fine-tune parts for a mitered frame.



CARCASE MITERS

A second auxiliary fence allows you to trim carcase miters, leaving them at precisely 45° and free of saw marks.





Locate the hole from underneath. *Hold the miter fence in position on the shooting board.*



Check the angle. *Make sure the fence is exactly 45° to the edge of the runway.*



Laminated block. *The large glue surface needs plenty of clamps to create enough pressure.*

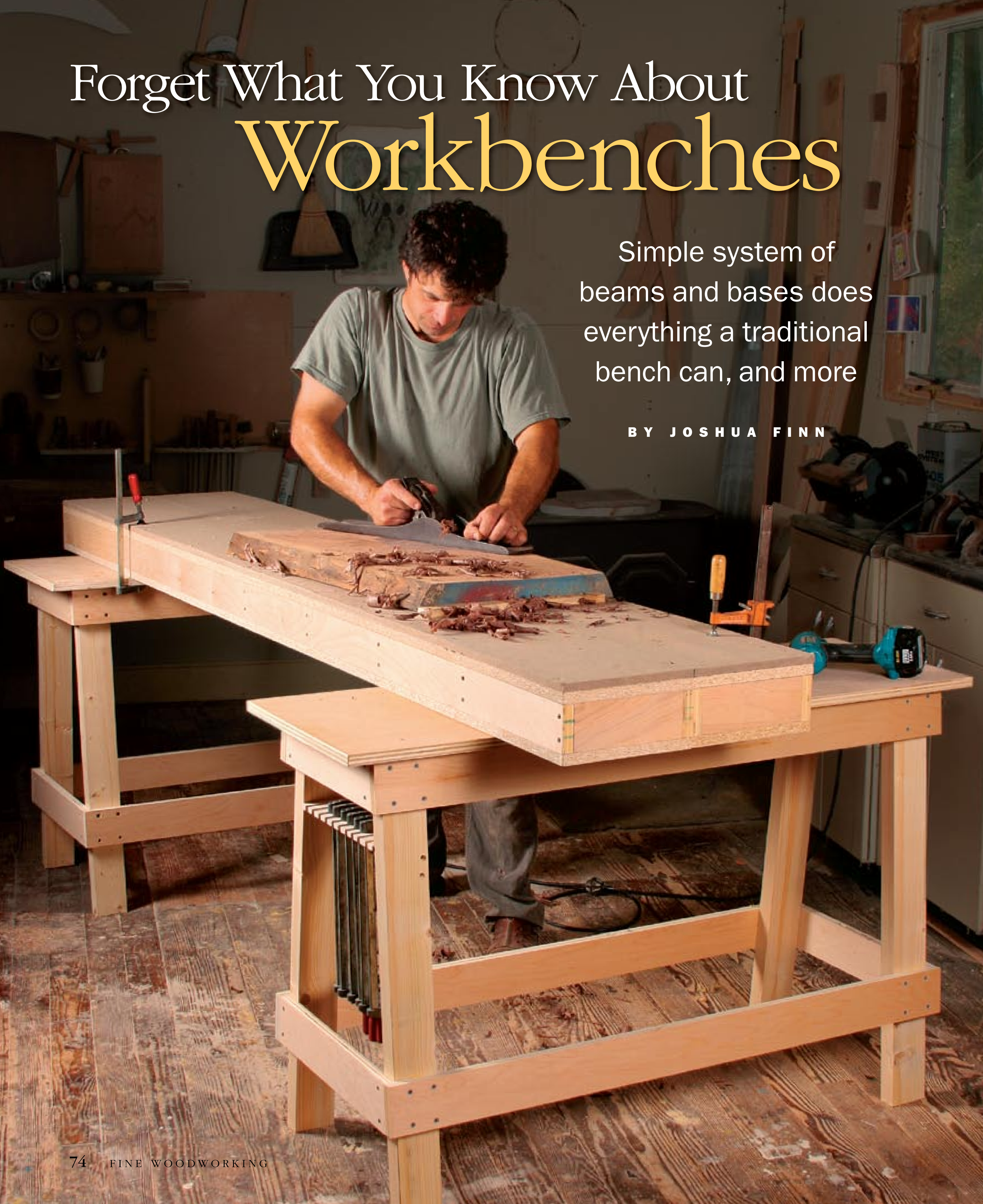


Quick change. *The T-nut, threaded rod, and knob allow quick removal of both miter fences.*

Forget What You Know About Workbenches

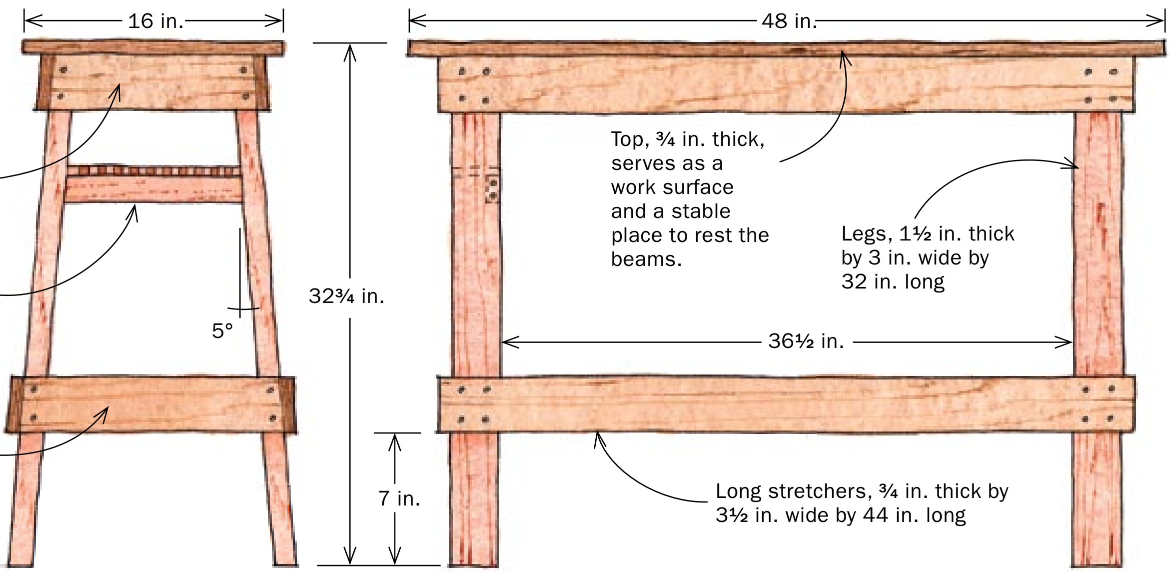
Simple system of beams and bases does everything a traditional bench can, and more

BY JOSHUA FINN



Make the bases first

The bases are easy to build using plywood and 2x4s. You can make them in a jiffy, then use them to assemble the torsion-box beams.



When I opened my first shop 12 years ago after years of apprenticing with other woodworkers, one of my first decisions was about my bench. I needed something that could accommodate the usual handwork for furniture making—planing, chiseling, and sawing—but I also wanted a bench that could serve as a work station for machine setups and for glue-ups. This versatile bench was the solution.

The design is a combination of a couple bench systems I had seen over the years. I worked in one cabinet shop in Brooklyn, N.Y., where the central assembly area was a set of fairly low benches with Homasote 440 fiberboard tops. The soft Homasote protected the casework from dings, and the nonslip surface was ideal for sanding. I found the other piece of the puzzle in a friend's upstate New York shop: two torsion boxes held up by sawhorses, a space-saving idea that also offered flexibility and strength.

I took the important details from those shops, added a few ideas of my own, and incorporated them all into this bench system. It features two long, narrow torsion-box beams with Homasote tops and melamine bottoms that rest across two wide, sawhorse-type bases.

Although I have my father's classic bench, an old Hammacher Schlemmer solid-maple workhorse with a face vise and a shoulder vise, it remains in my shop primarily for sentimental reasons. I now use this system for 98% of my benchwork. Even



Angle the legs and side pieces. *Cut a 5° bevel on the ends of the legs and a 5° angle on the ends of the short stretchers.*



Two drills speed assembly. *Start with the short stretchers and legs. Use the first to predrill with a countersink, the second to drive screws.*



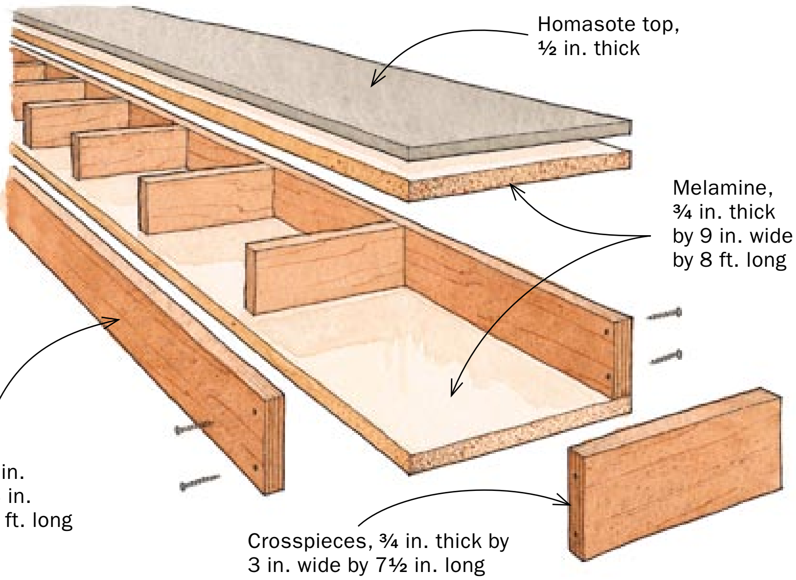
Glue and screw parts together. *Finn sinks only one of the four screws, then adds the others once he squares the long stretchers to the leg assembly.*



Add the top and a clamp rack. *The broad top supports the beams but also adds a handy work surface to the shop. The built-in rack keeps clamps close at hand.*

Build the beams

Two beams make for a flat, rigid work surface that switches from nonstick to non-marring by simply flipping the beams.



Assemble the nine crosspieces and two sides. *Finn uses clamps, moving them along the length as he works, to hold pieces flush and tight as he screws everything together.*



without vises and benchdogs, my bench design can accommodate any task that can be done on a traditional bench. It offers more flexibility, allowing me to set it up in different configurations for any job, and it can be broken down and stored out of the way. Plus the materials (2x4s, melamine, plywood, Homasote 440) are inexpensive (less than $150).

You can build this bench in less than a day, and you don't need a bench to make it (the usual conundrum when a beginner tries to make a big, traditional hardwood workbench).

Construction couldn't be easier

It makes sense to build the bases first, so you can assemble the beams on them. As you decide on a height for the bases, keep in mind the possibilities for multiple uses. Mine sometimes double as outfeed tables for my tablesaw. That height turns out to be a very comfortable working height for me. If your bases aren't going to do double duty as mine do, you should tailor their height to your own working preferences. In your calculations, don't forget to account for the extra 5 in. of the beams.

The bases are simple to build using glue and screws. The tops and stretchers are ¾-in.-thick plywood. The legs are made of 2x4s. But you can use solid furniture-grade lumber and mortise-and-tenon joinery if you wish.

Because this bench system relies on clamps for certain tasks, I added a simple L-shaped clamp rack to the side of each base. It's made from ⅜-in. Baltic-birch





Attach and smooth the melamine. *Apply the melamine faces to both sides of the torsion box (left), and soften the sharp edges with a file (above).*



Add the Homasote top. *The inexpensive Homasote creates a non-marring work surface over the rigid ¾-in. melamine. The core of the melamine will grab screws when you need serious holding power.*

Photos: Anissa Kapsales; drawings: Jim Richey

Hold your work with cleats and clamps



Use a cleat. *Finn screws scrapwood into the beams (right) to act as a stop, allowing him to handplane the surface of a board (see p. 74) or belt-sand a newel post (below).*





Lock it down for heavy planing. *A clamp holds the beam and base together, stabilizing the whole system and preventing the beam from getting pushed off the base during handplaning. A second clamp holds the board (also resting across the bases for extra support) to the beam.*

plywood with ⅜-in.-wide slots for the clamps. The sides of the rack are angled 5° to fit between the legs of the base (see drawing, p. 75).

I begin construction by squaring up the 2x4 legs with light passes on the jointer and planer, just to take the framing lumber look from them. Next, use a miter saw to cut a 5° bevel on the tops and bottoms of the legs. The short stretchers also have the 5° angle cut on each end.

Start assembly by gluing and screwing the short stretchers flush to the outside of the leg. Then attach the long stretchers flush with the face of the side stretchers. Once the bases are assembled, screw on the tops, which add weight and stability. Finally, slide the clamp rack into position and secure it with screws.

After the bases are constructed, move on to the two beams that make up the top of the bench. The beams are plywood torsion boxes with ¾-in. melamine faces





Handwork on smaller pieces. *A hand screw clamped to the beam holds a smaller board on edge for planing (left). Drawer parts are clamped to the beam for sawing (above) or chopping.*

Perfect for power tools



No clamps to get in the way. *Finn screws benchtop machines and tools through the cheap Homasote and into the melamine below to temporarily hold them in place, eliminating the need for clamps that could get in the way or loosen with vibration.*



top and bottom, and Homasote over one of those faces. After cutting the parts to size, lay out the positions of the internal crosspieces, placing a crosspiece every 12 in. and at the end. Attach the crosspieces to one long side first, then the other. Keep all the edges flush (important when you attach the tops) by pinching them tight with a small bar clamp while predrilling and screwing. When the frame is finished, I screw melamine to the top and the bottom, and apply the Homasote on one side.

Made from recycled paper, Homasote is a cheap, easy-to-find material that's non-marring and grippy enough that an orbital sander can be used on a workpiece without router pads or stops. And when the surface gets worn from use, a quick sanding with 60-grit paper using the orbital sander refreshes it, or you can quickly remove it altogether and put on a fresh piece. The exposed melamine on the opposite side is an easy-to-clean surface for glue-ups.

This bench does it all

From hand-cutting dovetails to assembling kitchen-cabinet boxes, this bench is up to any task. It is totally portable and easily stored on end if you work in a small area and need the floor space. It can be easily reconfigured to accommodate any task. For example, the two beams can be pushed together to create an 8-ft. by 18-in. tabletop, or moved apart to any width when constructing cabinets. I can put the beams end-to-end to create a 16-ft.-long surface that is useful for shaping long handrails or other pieces of unusual length. Even without the beams resting on them, the 16-in.-wide by 48-in.-long tops on the bases can be used as a lower work surface, individually or together.



Sanding is a snap. *Homasote is ideal as a sanding surface. It's soft enough that it won't mar workpieces, and it grips enough to hold your work without clamping it down whether you are hand-sanding or using a random-orbit sander.*

For most tasks, the weight of the beams and the bases (plus the wide tops of the bases) is enough to keep the system stable and in place. But for some jobs, such as handplaning the face or edge of a board, I clamp the workpiece to the beams and then clamp the beams to the bases. This locks everything in place so the forces I am applying don't move the workpiece or the bench.

To perform all the jobs possible that a traditional bench can handle, my bench system relies on clamps, screws, and cleats to hold the work in place. I hand-cut dovetails by clamping the pieces lengthwise to one of the beams. I handplane and scrape

Separate them for glue-ups



Clamping versatility is unequalled. *The beams can be moved apart to fit different widths. Access to all sides and the top and bottom of work makes clamping easy. Flipping the beams melamine side up for gluing makes cleanup easy, too.*



he faces of boards with the aid of a stop screwed into the beams. I use the same stop setup for beltsanding.

With this bench, it isn't necessary to devote permanent table space to benchtop machines and tools. I stow them until I need them and temporarily attach the tools to the beams when it's time to use them. I screw my dovetail jig down through the top for stability and to eliminate the need for clamps, which get in the way and tend to loosen with vibration. My mortiser gets attached the same way.

Clamping is easier than on a flat table or a traditional bench. You have the benefit of access all around and under the workpiece. There is no need for risers to get underneath the piece with clamps; the beams spread apart to accommodate different sizes.

What's more, cleaning around and under the bench is simple because it's open and easily moved, and I haven't found a workbench out there that makes a better lunch table. □

Joshua Finn owns a woodworking shop in High Falls, N.Y.

Line them up for long work



A 16-ft. bench. *Arranging the bases and beams end-to-end gives long work, like this stair rail, a stable place to rest while it's being sanded.*

Stop Suffering for Your Craft



A veteran's tool choices make woodworking easier on the body

BY ART LIEBESKIND

I have been woodworking for more than three decades, since I was a comparative stripling of 42 years. Now I'm an old oak, and when I work in my shop for any length of time, muscles shriek and nerves buzz. My body tells me that certain tasks have grown more difficult.

If you want to work wood for decades to come, you'll need to find ways that are gentler on sinew and bone. Fortunately, the market these days is brimming with ergonomically friendly tools and accessories. This article highlights some of my favorites—tools that have helped keep woodworking fun and relatively pain-free.

Don't wait until you're old and sore to take advantage of these innovations. Make woodworking easier right now by eliminating many of the small, sometimes hidden, struggles in the workshop. You'll find sources for the tools on p. 83.

Art Liebeskind is a logistics consultant and woodworker in Baltimore, Md.



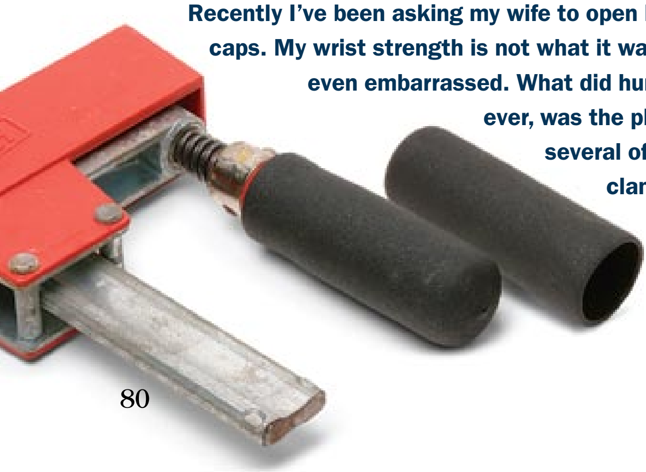
Get a better grip

Some woodworking tasks are just plain hard on your hands. I'm thinking especially of turning, as in driving screws; twisting, as in tightening clamps; and holding during assembly or while gripping a plane. Common aches and pains can magnify these difficulties, turning a simple task like driving a nail or planing a surface into an endurance test.

Recently I've been asking my wife to open beverage bottle caps. My wrist strength is not what it was and I am not even embarrassed. What did humble me, however, was the pliers marks on several of my parallel-jaw clamps. I just could not crank them tight enough by hand alone. Then I began using foam-rubber grips that slip over the clamp handles. The grips let me tighten the jaws without pain or mechanical leverage. Some clamp makers now offer bigger, "grippier" handles.

Chisels also can be difficult to handle, especially those with slender, rounded grips. If you find a square or octagonal handle on a good chisel, buy it. If not, refit your chisels with larger handles that are well shaped for your grip.

For a better grip in all kinds of applications, some woodworkers like to use cotton gloves with a latex coating on the palms.



Photos: staff

Saw on the pull stroke

The Japanese-type pullsaw was an exciting discovery for me even when I had lots of strength. The saw rewards a gentle grip and action with a cut that's smoother and more precise than a Western backsaw. The saws are relatively inexpensive, and there are a variety of blade types. The flexible blade with zero set is great alternative for cutting plugs and pegs flush to a surface, reducing time spent planing or sanding.



Gentler on the wrist. *A Japanese-style saw cuts on the pull stroke and requires less force.*

Sharpen by machine

Sharpening chisels and plane irons using a stone or sandpaper can be an exercise in suffering. The strokes are tiring and the grip—even with a honing guide—can be painful. This pain becomes a reason to postpone sharpening, which in turn causes more pain and danger from using dull tools. A dry-abrasive horizontal sharpener, which I purchased a year or so ago, rescued me from all of that. Its slow speed and controlled angles let me sharpen and hone a chisel or a plane blade in less than three minutes.



The quick way to a keen edge. *Sharpening can wear out the muscles and joints in your hand with repeated strokes that call for firm pressure and an awkward grip. A horizontal sharpening machine eases the process dramatically.*

Scrape with less effort

A sharp card scraper removes wood smoothly and quickly with great control. But I came late to hand-scraping and frankly too late to comfortably hold and flex a scraper by hand enough to get good shavings. The Lee Valley card-scraper holder (bottom) makes it simple and painless to scrape a wood surface. Another real arm-saver is the heavy scraping plane (not shown), versions of which are made by Lie-Nielsen and Lee Valley. Properly sharpened and tuned, it saves hours of hand- or random-orbit sanding.



Two thumbs down. *Scraping takes a toll. The process puts pressure on thumbs and fingers to flex the scraper for a decent cut.*



Better than just scraping by. *A scraper holder maintains a constant bow in the tool so your fingers don't have to, allowing for a much more relaxed grip.*



Power tools can prevent pain

Cordless power drivers are a godsend to the woodworker with arthritis in the hands and wrists. Their use as a drill is obvious, but their real gift is allowing you to drive screws without pain. With current advances in batteries and ergonomics, a lightweight 12-volt model can handle almost any drilling task.

Even more powerful are the cordless impact drivers that effortlessly "melt" large screws into hardwood. I recently used one to install a new deck surface, a job in which driving the screws by hand would have been impossible.

A small but powerful trim router that can be held with one hand is much easier to use than a full-size router in roundover or hinge-setting operations, for example. The Bosch Colt router has become a mainstay in my shop for profiling the edges of already assembled cases and drawers. It is not only quite powerful, but it's also ergonomically designed for one-handed use. Fitted with a flush-trimming bit, it saves much hand-scraping and planing when trimming edge-banding on plywood.



One for drilling, one for driving. *The combination of a cordless drill and an impact driver can save you lots of grief.*



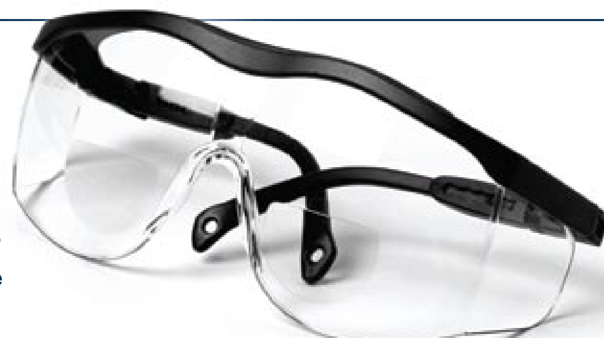
One-handed routing. *For light-duty tasks such as mortising for a hinge, a lightweight router is much easier on hands and wrists.*

Make the work easier on your eyes





Little numbers are hard to see. *A dial caliper is an excellent tool, but even the best gauges have tiny numerals that can be hard to read. A caliper with a large digital readout makes measuring easier on the eyes.*

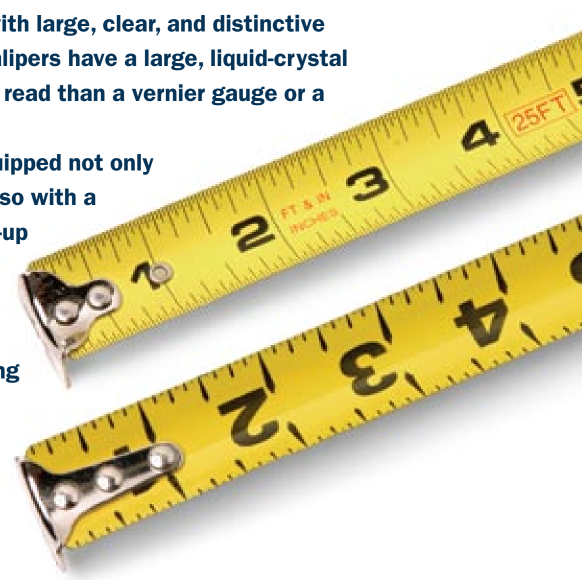


As we grow older, many of us need corrective lenses to read a ruler or see a layout line. There are other tools that can help you see what you're doing.

Safety goggles or safety glasses with a magnifying insert act as tiny bifocals that allow you to read the fractional increments on a ruler or place a drill hole accurately. At the same time, of course, they protect your eyes from flying particles.

Look for measuring tapes with large, clear, and distinctive markings. Electronic digital calipers have a large, liquid-crystal readout that is much easier to read than a vernier gauge or a 1⁄64-in. increment on a ruler.

Use a desk lamp that is equipped not only with an articulated light but also with a magnifying lens for easy close-up work. These lamps, as well as the magnifying safety glasses, are useful for inspecting the progress made while sharpening edge tools.



Save your back



I won't belabor back braces and proper lifting procedures to avoid damaging your back. Let's focus on the stuff that is just too heavy to lift, even if you once could bench-press 250 lb. A good friend, partner, or strong spouse is the best tool ever invented to save your back. Get one and treat him or her well. Remember, this helper plays a dual role: He or she can also be blamed for any errors in judgment.

A small scissor-lift hydraulic table (prices start at $220) can lift equipment or cabinet assemblies from 5 in. off the floor to bench or machine-table height. It's also great for loading or unloading a pickup truck. This device makes a superb assembly table: It can position the work at proper height to minimize stretching and awkward reaches.

An anti-fatigue floor mat is great. Your feet and back will be even more grateful if you keep a padded stool near the bench. Many tasks, such as chopping dovetail waste or wiping finish on small parts, lend themselves well to working from a seated position. Look for a stool that's adjustable so you can set it at your optimum working height.



A little pick-me-up. *A scissor-lift cart lifts heavy materials to bench height, and makes a multilevel work surface.*

Try an upright shop vacuum

For the last several years, the shop cleanup routine involved tedious broom action and a loud call to my beloved spouse to come hold the dust pan. A canister-type shop vacuum can reduce that nuisance, particularly if it has a long enough wand to allow an upright stance. Better still for me was a "Shop Sweep" from Shop-Vac. This machine is kind of a super upright vacuum with a huge bag. It sweeps up chips, nails, coins, and small careless children—all without my bending down. My wife has not been called to help with cleanup since we bought the Shop Sweep. (Some of you will not consider this progress, but your significant other will.)



Clean floors without stooping. *For Liebeskind, a heavy-duty upright vacuum is much easier to use than a canister vacuum or a broom and dustpan.*

SOURCES OF SUPPLY

CLAMP-HANDLE GRIPS
www.rockler.com

BIFOCAL SAFETY GLASSES
www.woodcraft.com

JAPANESE PULLSAWS
www.japanwoodworker.com

CARD-SCRAPER HOLDER, HORIZONTAL SHARPENING SYSTEM
www.leevalley.com

DIGITAL CALIPER
www.woodworker.com

SCISSOR-LIFT TABLE
www.jettools.com
(click on "material handling")

Other items available at home centers.

readers gallery



KEITH TURNER
Surrey, B.C., Canada

After Turner used his first infill planes while taking a course in England with David Charlesworth, there was no turning back. Upon returning home, he studied their construction and built his own. This rosewood, brass, and steel shoulder plane, based on the Norris A7, is 8 in. deep by 1½ in. wide by 3½ in. tall. The rosewood is finished with shellac.



ED MUSHO
Portland, Ore.

Musho calls this his "nook-and-cranny plane." He designed it specifically to clean out rabbet cuts on custom windows, but he's found it very useful in any narrow channel or right-angle corner. To make the plane, he mounted the hardened tool-steel blade onto a piece of padauk at a 30° angle. Brass registration pins and bars keep the blade in place. The tool (4 in. deep by ½ in. wide by 3 in. tall) is finished with boiled linseed oil and beeswax.



JOE FISHER
Lake Hopatcong, N.J.

By taking a countersink made for a power drill and adding an elm handle, Fisher created a hand tool. After drilling the hole for the countersink, he turned the tenon for the copper ferrule and the body of the handle. Next, Fisher epoxied the countersink into the handle and finished the wood with EEE polishing compound and Shellawax. The tool is 1½ in. dia. by 5½ in. long and works great, he says.



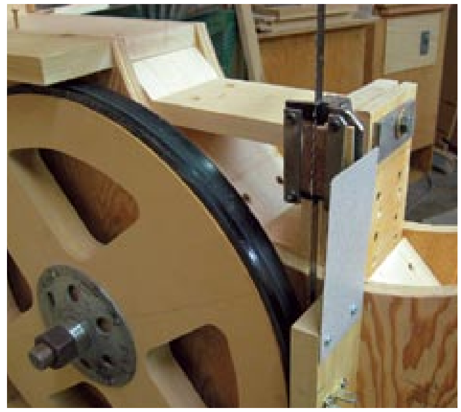
JAMES MURSELL
Pulborough, West Sussex, England

When Mursell began teaching Windsor chairmaking, he gave his students traditionally shaped spokeshaves with handles. But they tended to hold the handles with their fists and had no fine control over the tool, so Mursell began making these shaves. The lack of conventional handles forced the students to hold the tools with their fingertips close to the blade, giving them greater success. These hard-maple spokeshaves, equipped with blades from Hock and Bristol Design, have an oil finish.



NICK BOYNTON
Missoula, Mont.

This shopmade bandsaw, 22 in. deep by 47 in. wide by 84 in. tall, has seen Boynton through hundreds of woodworking projects. The plywood-and-maple framework and table are torsion-box construction. Boynton says he took great care to accurately balance the 21-in. medium-density fiberboard wheels with glued-on rubber tiles. He used a hacksaw and a drill press to create the steel blade guides and tension/tilt mechanism. The saw uses a 146-in. blade; it has a 14-in. resaw capacity and a 20-in. rip capacity.





TIM PERKES
Bellingham, Wash.

As a beginning woodworker, Perkes has a dual motivation for making his own tools: He can get new tools with a limited budget, and he can hone his woodworking skills at the same time. The lignum vitae sole of this shoulder plane is glued and dovetailed to the bloodwood body. The blade is made from a ¾-in. spade bit, the wedge is ebony, and the finish is boiled linseed oil. PHOTO: RAQUEL RICHARDS

DOUG GORDON
Nelson, New Zealand

To make most of these mini turning tools (ranging in length from 6 in. to 8¾ in.), Gordon brazed high-speed steel onto the ends of Allen keys. The skew chisel (center left) was made from a jointer blade, the thin parting tool (center right) from a high-speed-steel hacksaw blade. The handles are a variety of woods including magnolia, black walnut, yew, grapefruit, New Zealand red beech, rhododendron, and plum.



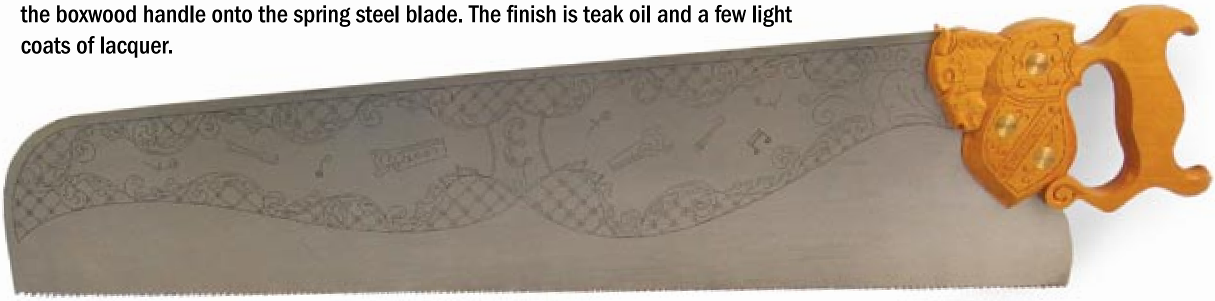


MARK ARMBRUSTER
Challis, Idaho

A woodworker and a knife maker, Armbruster used soft iron keystock for the shafts of these scratch awls, which are approximately 1¼ in. dia. (handles) by 5½ in. long. He heated the metal to shape the twists and turns, and then used an abrasive wheel to grind the finished edges, moving to a buffing wheel for the final polish. The brass ferrules are silver-soldered to the shaft and epoxied to the handles, which are zebrawood, cocobolo, and tulipwood. PHOTO: TIM WILKINS

ANDREW LUNN
Worthington, Ohio

Lunn's goal as a toolmaker is exceptional function, but personality and visual appeal matter, too. This 26-in. ripsaw, with 5½ tpi, carries Lunn's original etching design from the boxwood handle onto the spring steel blade. The finish is teak oil and a few light coats of lacquer.





JOSEPH LOMBARDO
Lockport, N.Y.

Lombardo used a flea-market find (a lathe with a good motor) as the guts for this lathe, 18 in. deep by 10 ft. long by 3 ft. tall. Investing about $200 and 75 hours of elbow grease, he cleaned up the rusty steel parts and made the cherry frame. He now has a lathe that can turn up to an 8-ft. pillar. The finish is wax.

Tool chests

For some woodworkers, where to store tools is as important as the furniture that is made with them. It's no wonder that two prominent woodworking schools use this passion for tool-chest perfection to teach valuable skills and instill a respect for quality craftsmanship and hand tools.

At the Center for Furniture Craftsmanship in Rockport, Maine, students begin with basic hand-tool techniques and joinery, then move on to building wall-mounted tool cabinets. The project introduces them to machine-based joinery techniques such as finger joints, mortise-and-tenon joints, rabbeting, coopering, tongue-and-groove, dadoes and housed tenons, pattern shaping, hinge mortising, frame-and-panel backs, and the French cleat.



MASON McBRIEN

Rockport, Maine

Although students are required to stick to a standardized design for this curved-front cabinet (9 in. deep by 26 in. wide by 36 in. tall), they do get to choose the wood and the finish, and vary the interior slightly. McBrien used hard maple for the carcase and cherry plywood for the back. He finished the cabinet with Waterlox Original.



A tool chest is the first project at North Bennet Street School's Cabinet and Furniture Making program. Students move from the drafting process to a finished piece in 4 to 8 weeks. They are given a set of parameters, a list of common woods, and a range of dimensions. They must include 4 to 5 levels of drawers, and 1 to 3 panels in the frame-and-panel front. From their drawings, students generate a stock list, choose lumber, lay out, and mill parts. Then they move on to gluing boards for panels, dovetails, mortise-and-tenon joints, drawer making and fitting, frame-and-panel construction, surface preparation, and finishing.

TOM MONAHAN

Sudbury, Mass.

Monahan used quarter- and riftsawn cherry for his tool chest (17 in. deep by 34 in. wide by 20 in. tall). A frame-and-panel front slides up and out, then into the carcase to reveal the drawers. Monahan appreciated the project's emphasis on techniques and quality craftsmanship over speed, fancy embellishments, or exotic woods, saying it allowed students to "show off their technical chops." The finish is shellac. PHOTO: LANCE PATTERSON



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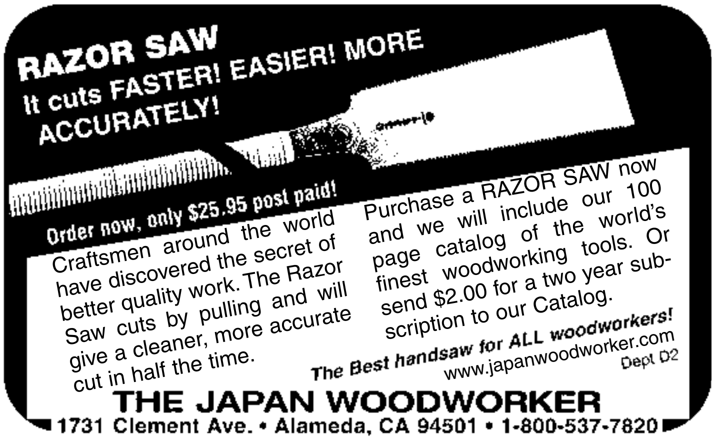
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Q&A

Troubleshooting the jointer

Q: I am having trouble with my 6-in. jointer. Every board I edge-joint ends up tapered. I have adjusted the outfeed table, checked the gibs and locking nuts, and even tried taking a very light (1⁄32-in.) cut. Nothing I do gets rid of the taper. Do you have any suggestions on the cause and solution?

—TONY GRANELLI, Idlewild, Mich.

A: BEFORE YOU BLAME THE MACHINE, check your technique. First, try transferring pressure to the outfeed side of the workpiece as soon as possible. Keeping pressure on the infeed side will cause tapering.

If that doesn't work, check that your outfeed table is set slightly below the highest point of the knives' arc. Align the cutterhead so that one blade is at its high point and lay a straightedge across the knife and table. There should be a gap no greater than the thickness of a sheet of photocopier paper between the straightedge and outfeed table just after the cutterhead.

If aligning the outfeed table doesn't get rid of the taper, check that the infeed and outfeed tables are coplanar. Raise the infeed table to full height, move the cutterhead so that no knife is above the tabletop, and lay a 4-ft. straightedge along the infeed and outfeed tables. If the tables aren't in the same plane, you'll have to shim the ways to fix the problem.

—Steve Latta is a contributing editor.



FIRST, CHECK YOUR TECHNIQUE

Press the board against the fence with your left hand, and transfer the pressure of your right hand to the outfeed side of the board as soon as possible.

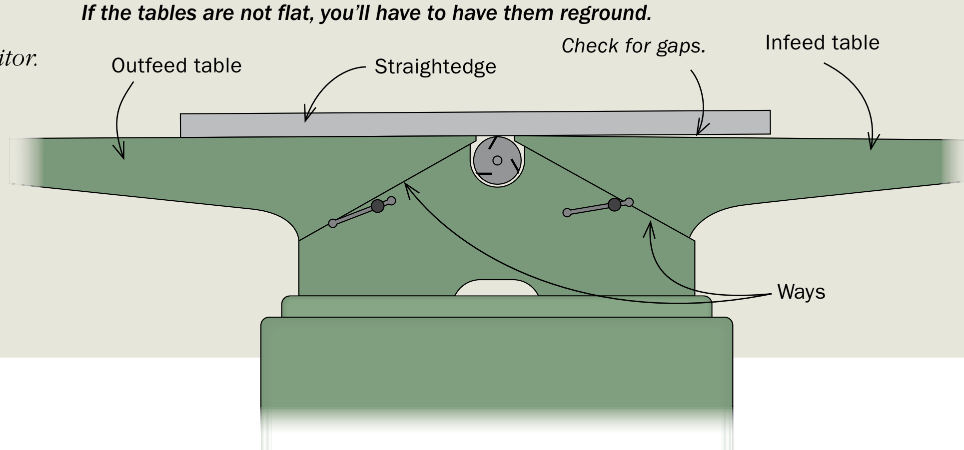


THEN CHECK THE HEIGHT OF THE OUTFEED TABLE

With a knife at the highest point in its rotation, the gap between the straightedge and the outfeed table should be no more than the thickness of a piece of photocopier paper.

LAST, MAKE SURE THE TABLES ARE COPLANAR

If there's any space between the straightedge and the tables, then the tables aren't coplanar. If each table is flat, you can shim the ways to bring them into alignment. If the tables are not flat, you'll have to have them reground.



Ask a question

Do you have a question you'd like us to consider for the column? Send it to Q&A, *Fine Woodworking*, 63 S. Main St., Newtown, CT 06470, or email fwqa@taunton.com.

Photos: staff; drawings: Vince Babak



Where a blade meets a bit. A molding head runs in a tablesaw, but cuts profiles like a router bit. Molding heads excel at profiling the middle of wide boards, something a router can't do.

Why use a tablesaw molding head?

Q: I've seen tablesaw molding heads for sale and wondered what they're used for. Is there an advantage to using them?

—STANLEY DROZD, Chicago, Ill.

A: A MOLDING HEAD IS A CUTTERHEAD for the tablesaw that cuts profiles much like a router or shaper does. Some have interchangeable knives and cut numerous profiles.

The popularity of routers has made molding heads a rarity, but they have a couple of advantages over a router or router table. They can produce a very smooth cut. Because of the large radius, the cutters enter and exit the stock at a much shallower angle than a router bit, which reduces tearout.

Also, the larger table and outfeed support of the tablesaw make it easier to profile long pieces such as baseboard moldings. Another benefit is the ability to mill profiles on the center of boards, such as a bead on a back board.

These advantages come at a price. A starter kit from Magic Molder (www.lrhent.com) with two profiles is $265. Additional profile sets are $99.

—Michael Pekovich is FWW's art director.

Cook pine to harden the sap

Q: I bought some air-dried white pine. The moisture is at 10%, but it's still oozing pitch. I'm worried that it will bleed through a finish. Any suggestions?

—JULES HARLAN, El Paso, Texas

A: A COAT OF SHELLAC works on older wood. On fresh-cut wood, however, the best solution is to heat it for 24 hours at 170°F.

If the pieces are small enough, you can use a kitchen oven.

For larger pieces, I make a temporary kiln from foil-faced foam insulation. It has two sides, two ends, and a top, but no bottom.

Make a hinged vent at the top of one end by cutting off a 6-in.-wide strip and reattaching it with tape.

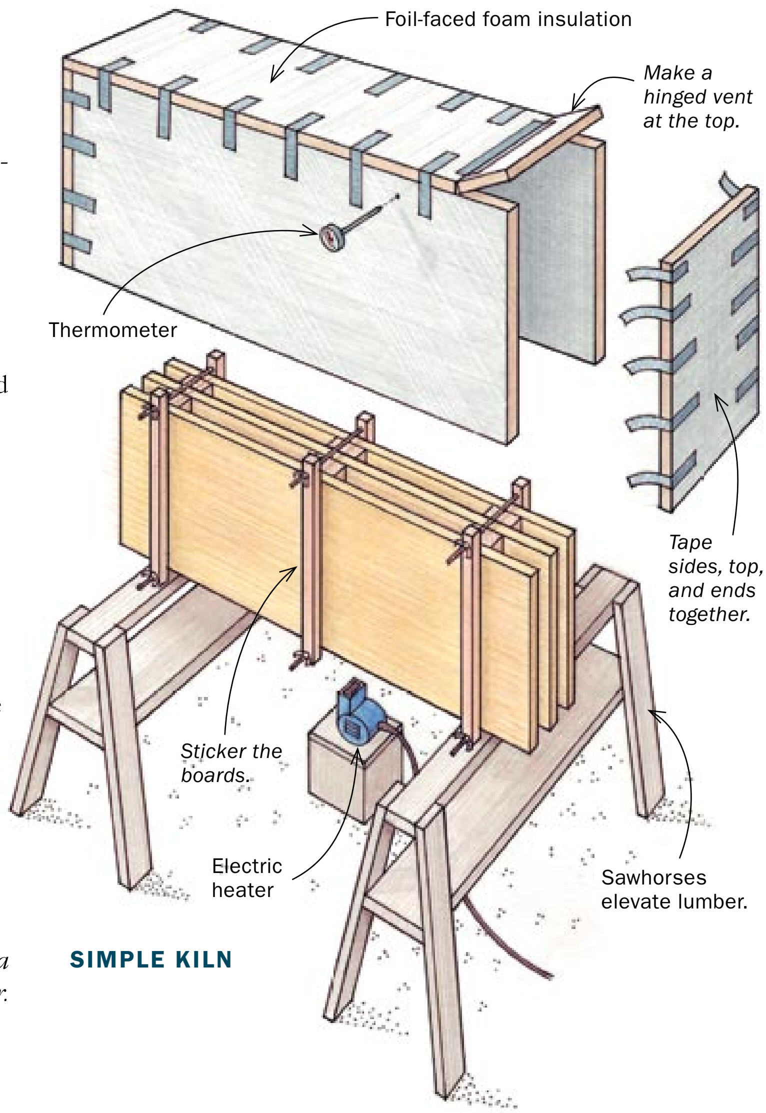
Stack the boards, placing stickers at 2-ft. intervals, and cover them with the kiln. Use an electric heater to heat the kiln to 170°F. Track the temperature with a thermometer. Adjust the vent to maintain it.

Pitch might ooze and settle on the surface, but once it cools, it can be scraped off.

—Christian Becksvoort is a contributing editor.



Woodworker's oven. *Becksvoort uses a kiln made from foil-faced rigid insulation to cook large pine boards and set the pitch.*



SIMPLE KILN



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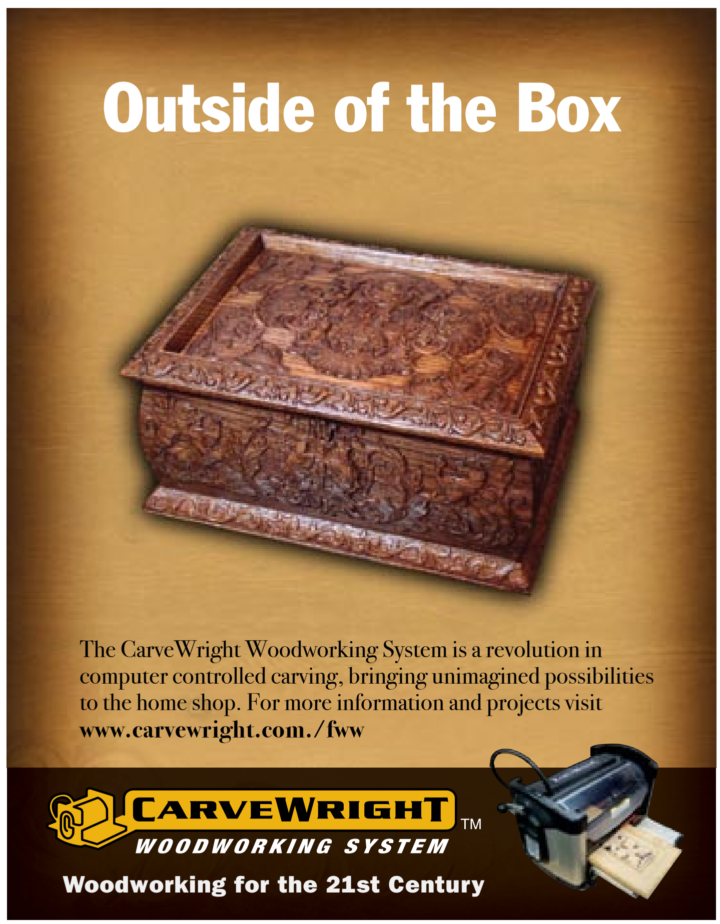
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Can a miter-saw blade be used on a tablesaw?

Q: I have a 10-in. miter saw with a thin-kerf, 60-tooth blade. Can I use that blade to cut shopmade inlay on my tablesaw?

—BEN HUDSON, Chattanooga, Tenn.

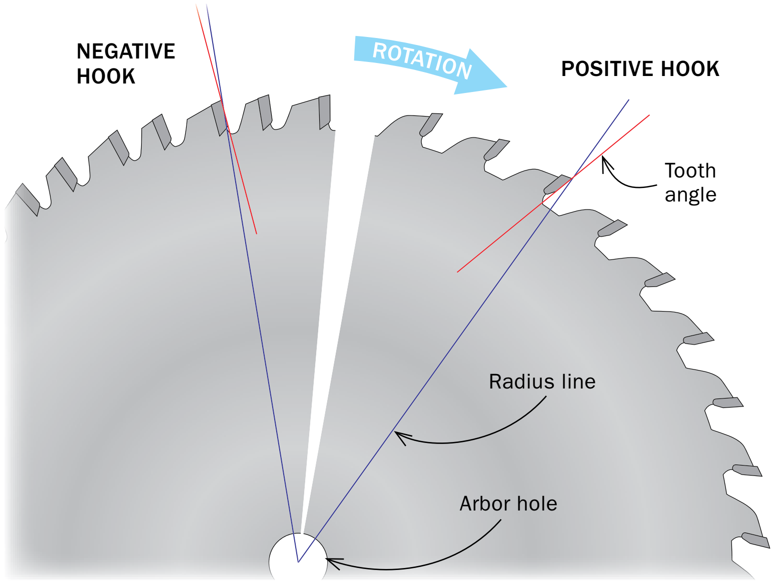
A: YES, YOU CAN. HOWEVER, since your miter-saw blade is thin-kerf, you might need to change the tablesaw's splitter. If the splitter is thicker than the blade, the workpiece will get caught on it and you'll be unable to feed it through.

Also, some miter-saw blades have a negative hook angle on their teeth. Used in a miter saw, this geometry forces the workpiece down onto the table and against the fence. On a tablesaw, it tends to lift the workpiece. Use a long push board and apply downward force to overcome it.

—John Leko makes custom furniture in Huntsville, Ala.

DETERMINE THE HOOK ANGLE

On a tooth with a negative hook, the angle of the tooth falls to the left of the radius line. On a tablesaw, this tends to lift the workpiece. A tooth with a positive hook angles toward the rotation of the cut.



How to sharpen chisels with nonparallel sides

Q: I have a few large mortising chisels that taper from the bolster to the cutting edge. Unfortunately, my honing guide requires the chisel to have parallel sides, or the cutting edges end up skewed. Can I use a honing jig and get a square cutting edge?

—MIKE WOOLF, Vashon, Wash.

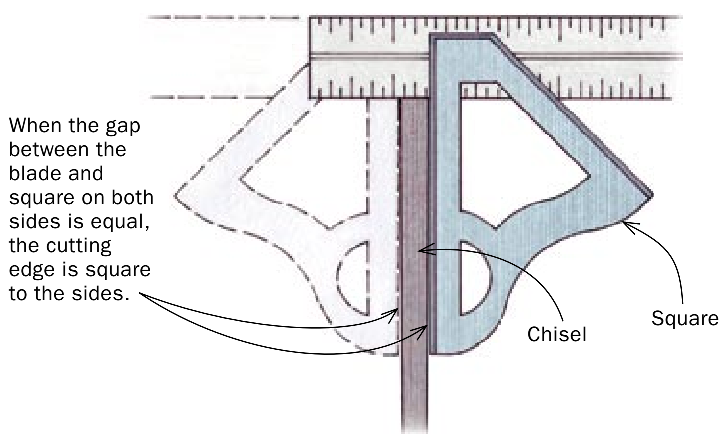
A: YOU'LL HAVE TO SQUARE the chisel in the jig by eye. First set the chisel to the desired honing angle. Then adjust it so that the cutting edge is square to the sides of the honing guide.

As you hone the primary bevel, periodically check the cutting edge with a small square. Look for the gap on each side to be the same.

—Hand-tool expert Chris Gochnour is a frequent contributor.



Use your eye, but trust a square. *Some mortise chisels are tapered along their length. Trust your eye to align the chisel in a honing guide, but check the honed tip with a small square.*



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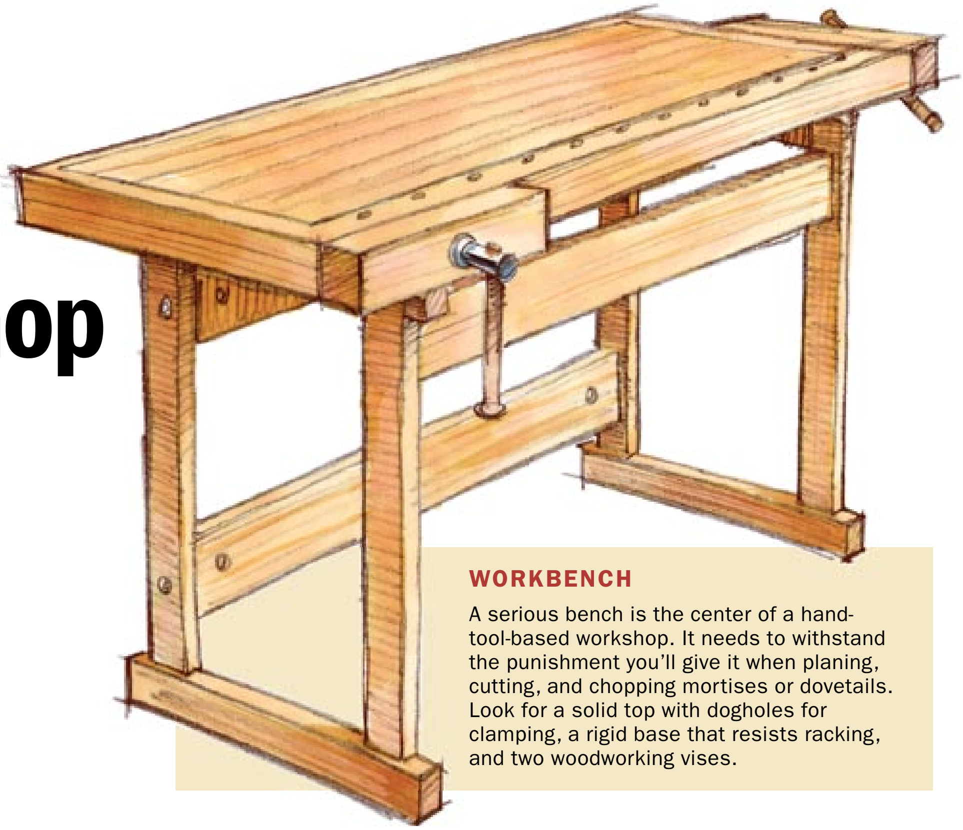
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Hand-tool shop saves space

BY JOHN NESSET



WORKBENCH

A serious bench is the center of a hand-tool-based workshop. It needs to withstand the punishment you'll give it when planing, cutting, and chopping mortises or dovetails. Look for a solid top with dogholes for clamping, a rigid base that resists racking, and two woodworking vises.

Most passionate woodworkers imagine themselves in a spacious shop full of the best hand and power tools. In this age of apartment living and tight budgets, however, the reality is often limited space and funds. Yet there's no reason for those conditions to restrict a serious woodworker. In the tightest of quarters and with a limited budget, you still can indulge a passion for woodworking.

For eight years, I worked wood first in the corner of a dingy basement, then in an apartment dining room, and lastly in a 9-ft. by 12-ft. four-season porch. I turned out a respectable body of work during that time—some of it winning awards—and I did it all with hand tools. I even resawed and thicknessed lumber by hand.



For less than the cost of a cabinet saw, you can equip your shop with a set of hand tools versatile enough to build whatever you design. And you'll make very little noise and fine dust, meaning you can work almost anywhere.

Work wood without constraint

Power tools are more efficient at some tasks, like dimensioning lumber, but hand tools outshine them where it counts: creativity and craftsmanship.

Unconstrained by fences, guides, and jigs, hand tools place no limitations on your design, and they allow you to create forms and details not possible with power tools.

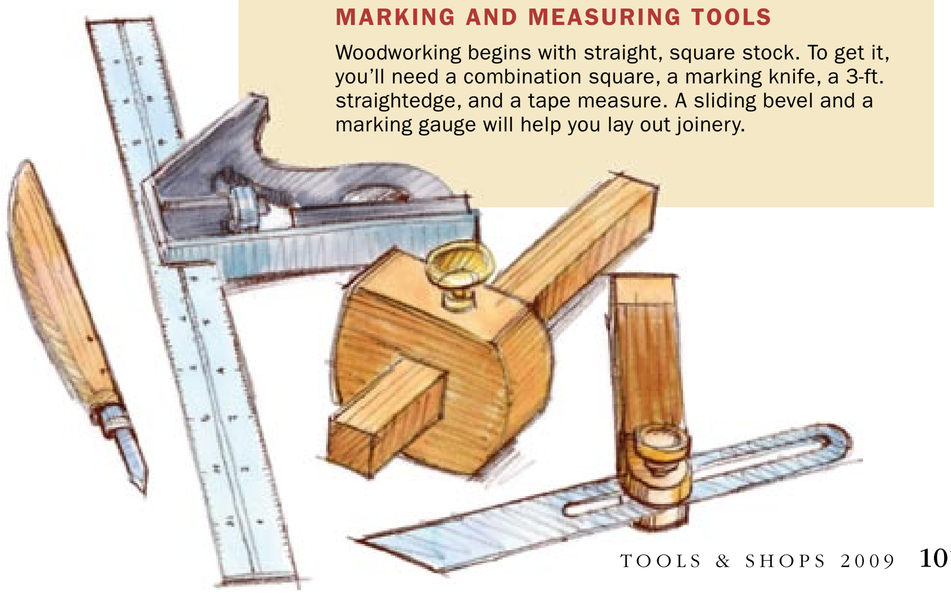
Hand tools also allow you to work more precisely with less fuss. To cut a tight dovetail, for example, you need only cut and pare to your layout lines. There's no time wasted fiddling with bit depths and jig setup.

But precision isn't necessary everywhere. A set of legs should be the same length, but the individuality given to each by handwork lends them charm and character. You know they were made by a craftsman.

Workbench is foundation of the shop

The starting point of any serious woodshop, especially one where hand tools dominate, is a workbench. My first bench was a rickety table—not easy to use. So one of my first projects was a proper bench with a face vise and tail vise.

A workbench makes everything else possible. It's where you plane boards, cut and chop joinery, and assemble your



MARKING AND MEASURING TOOLS

Woodworking begins with straight, square stock. To get it, you'll need a combination square, a marking knife, a 3-ft. straightedge, and a tape measure. A sliding bevel and a marking gauge will help you lay out joinery.



HAND TOOLS

Hand tools are quiet and cleanup is easy, which makes them perfect for small shops. You'll need a No. 5 jack plane and a low-angle block plane, a dozuki (or backsaw), a set of bench chisels and a mallet, some sharpening stones, and clamps. A No. 4 smoothing plane, a No. 7 jointer plane, and a shoulder plane would be good first additions to the core set.

projects. Without a strong bench, you really can't work effectively.

A bench for a small shop must be compact, but it can still be rigid and heavy. If you have to, weight it down with cinder blocks or sandbags.

The hand tools you need

You don't need a large collection of hand tools to build furniture. I worked for a long time with a set that fit on a shelf 6 ft. long and 1 ft. wide.

You can't build furniture if you don't have square stock and can't measure parts, so begin with measuring and marking tools. You'll need a combination square, a marking knife, a marking gauge, a sliding bevel, a 3-ft. straightedge, and a tape measure.

Handplanes can be used to joint, shape, trim joinery, and smooth surfaces. Start with a No. 5 jack plane. It's lighter than a No. 7 jointer and longer than a No. 4 smoother, but it can do the job of both. A low-angle block plane will let you trim joinery and end grain, and chamfer edges.

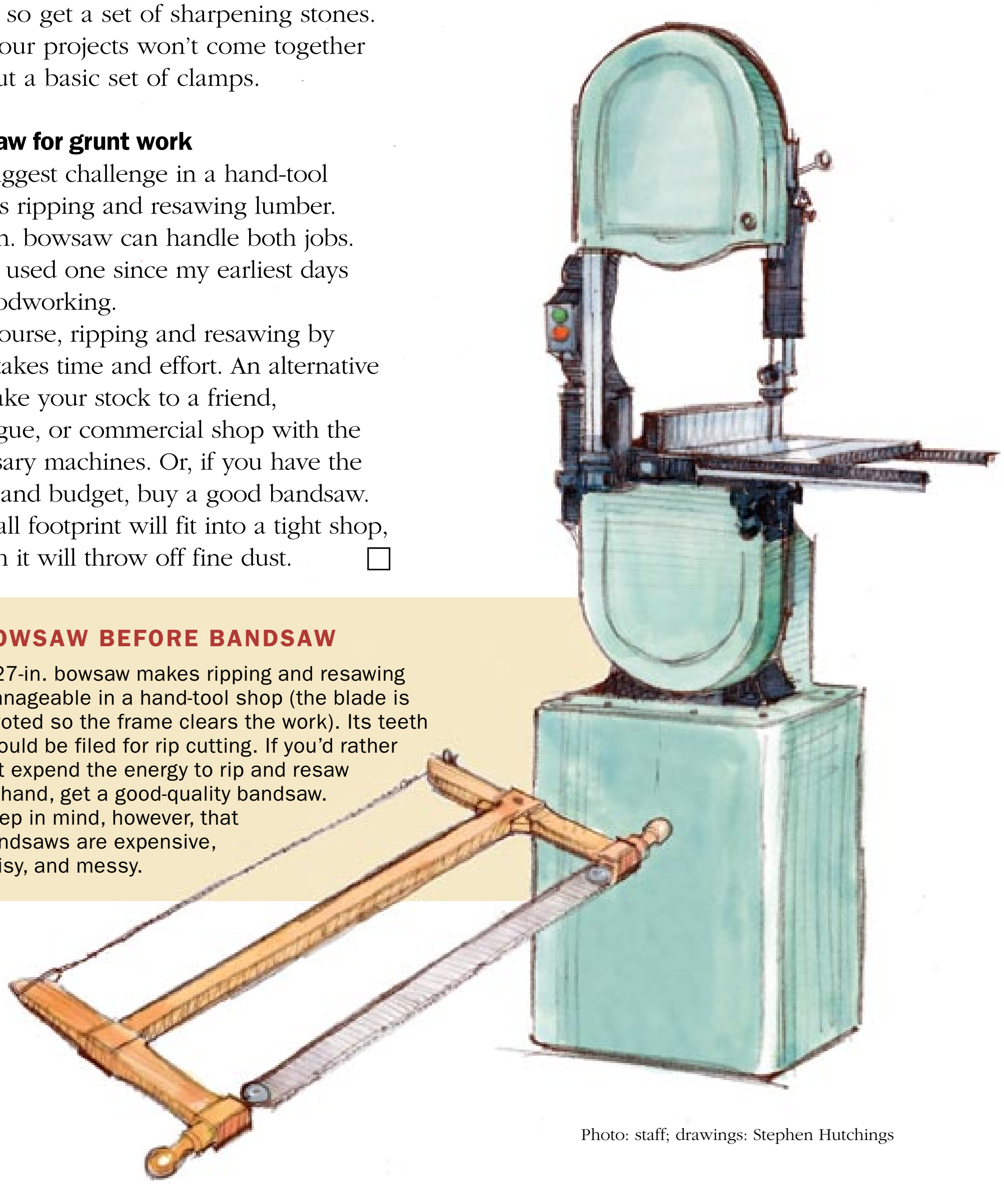
You'll need a backsaw or dozuki depending on your preference for cutting on the push stroke or pull stroke, and a set of bench chisels and a mallet to chop out waste and clean up joints.

Two more things to remember: Your tools will be worthless if they're not sharp, so get a set of sharpening stones. And your projects won't come together without a basic set of clamps.

Bowsaw for grunt work

The biggest challenge in a hand-tool shop is ripping and resawing lumber. A 27-in. bowsaw can handle both jobs. I have used one since my earliest days in woodworking.

Of course, ripping and resawing by hand takes time and effort. An alternative is to take your stock to a friend, colleague, or commercial shop with the necessary machines. Or, if you have the space and budget, buy a good bandsaw. Its small footprint will fit into a tight shop, though it will throw off fine dust. □



BOWSAW BEFORE BANDSAW

A 27-in. bowsaw makes ripping and resawing manageable in a hand-tool shop (the blade is pivoted so the frame clears the work). Its teeth should be filed for rip cutting. If you'd rather not expend the energy to rip and resaw by hand, get a good-quality bandsaw. Keep in mind, however, that bandsaws are expensive, noisy, and messy.

Photo: staff; drawings: Stephen Hutchings


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Just a Handful of Tools



Ask William Robertson what he does for a living and he might pull this toolbox out of his pocket. Robertson, who lives in Kansas City and has been making miniatures for 32 years, travels widely and often carries the toolbox with him as a calling card. It travels in its own specially made case, which might otherwise comfortably cradle an egg. Built at 1⁄12th scale, the toolbox and its contents are an adaptation of the Hewlett chest, a "gentleman's chest" made in England in 1773 and still filled with its original tools. Now in the collection at Colonial Williamsburg, the original is mahogany, but Robertson used mopane, an African wood whose extremely fine grain makes it look realistic in scale work.

The little chest's joinery, much of it cut with a jeweler's saw, includes dovetails on the case, the drawers, and even on the Swiss pear tray for the calipers in the upper drawer—though the sides of the tray are just 0.015 in. thick. Robertson used African blackwood for the handle of the claw hammer and boxwood for the egg-shaped handles of the five gimlets, whose metal shafts slide into holes for storage.

All the tools are functional, from the hand-engraved boxwood folding rule with its five-leaf hinge, to the brass and steel backsaw boasting 160 teeth per inch. The two tiny handplanes he made for this chest not only work, they work so well they've become an indispensable part of Robertson's kit for making more miniatures.

—Jonathan Binzen

Photo: Bruce Dale

Pro Portfolio To see a range of Robertson's miniature furniture and hear him describe his work, go to FineWoodworking.com/extras.